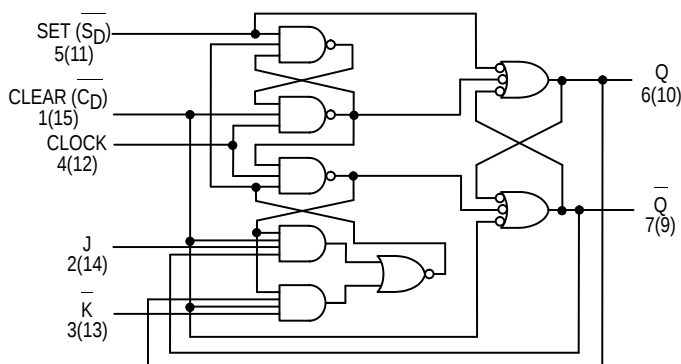




DUAL JK POSITIVE EDGE-TRIGGERED FLIP-FLOP

The SN54/74LS109A 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 by simply connecting the J and K pins together.

LOGIC DIAGRAM



MODE SELECT — TRUTH TABLE

OPERATING MODE	INPUTS				OUTPUTS	
	S _D	C _D	J	K	Q	Q̄
Set	L	H	X	X	H	L
Reset (Clear)	H	L	X	X	L	H
*Undetermined	L	L	X	X	H	H
Load "1" (Set)	H	H	h	h	H	L
Hold	H	H	l	h	q	q
Toggle	H	H	h	l	q	q
Load "0" (Reset)	H	H	l	l	L	H

* Both outputs will be HIGH while both S_D and C_D are LOW, but the output states are unpredictable if S_D and C_D go HIGH simultaneously.

H, h = HIGH Voltage Level

L, l = LOW Voltage Level

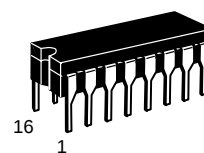
X = Don't Care

l, h (q) = Lower case letters indicate the state of the referenced input (or output) one set-up time prior to the LOW to HIGH clock transition.

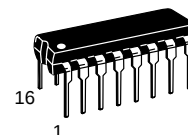
SN54/74LS109A

DUAL JK POSITIVE
EDGE-TRIGGERED FLIP-FLOP

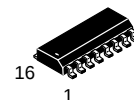
LOW POWER SCHOTTKY



J SUFFIX
CERAMIC
CASE 620-09



N SUFFIX
PLASTIC
CASE 648-08

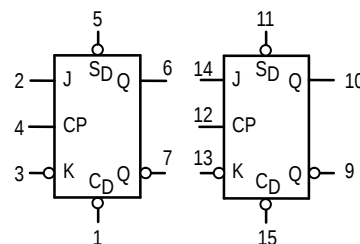


D SUFFIX
SOIC
CASE 751B-03

ORDERING INFORMATION

SN54LSXXXJ Ceramic
SN74LSXXXN Plastic
SN74LSXXXD SOIC

LOGIC SYMBOL



V_{CC} = PIN 16
GND = PIN 8

SN54/74LS109A

GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V _{CC}	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T _A	Operating Ambient Temperature Range	54 74	−55 0	25 25	125 70	°C
I _{OH}	Output Current — High	54, 74			−0.4	mA
I _{OL}	Output Current — Low	54 74			4.0 8.0	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 for All Inputs
V _{IL}	Input LOW Voltage	54			0.7	V	Guaranteed Input LOW Voltage for All Inputs
		74			0.8		
V _{IK}	Input Clamp Diode Voltage			−0.65	−1.5	V	V _{CC} = MIN, I _{IN} = −18 mA
V _{OH}	Output HIGH Voltage	54	2.5	3.5		V	V _{CC} = MIN, I _{OH} = MAX, V _{IN} = V _{IH} or V _{IL} per Truth Table
		74	2.7	3.5		V	
V _{OL}	Output LOW Voltage	54, 74		0.25	0.4	V	I _{OL} = 4.0 mA
		74		0.35	0.5	V	I _{OL} = 8.0 mA
I _{IH}	Input HIGH Current J, K, Clock Set, Clear				20 40	μA	V _{CC} = MAX, V _{IN} = 2.7 V
	J, K, Clock Set, Clear				0.1 0.2	mA	V _{CC} = MAX, V _{IN} = 7.0 V
I _{IL}	Input LOW Current J, K, Clock Set, Clear				−0.4 −0.8	mA	V _{CC} = MAX, V _{IN} = 0.4 V
I _{OS}	Output Short Circuit Current (Note 1)		−20		−100	mA	V _{CC} = MAX
I _{CC}	Power Supply Current				8.0	mA	V _{CC} = MAX

Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

AC CHARACTERISTICS (T_A = 25°C, V_{CC} = 5.0 V)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
f _{MAX}	Maximum Clock Frequency	25	33		MHz	V _{CC} = 5.0 V C _L = 15 pF
t _{PLH}	Clock, Clear, Set to Output		13	25	ns	
t _{PHL}			25	40	ns	

AC SETUP REQUIREMENTS (T_A = 25°C, V_{CC} = 5.0 V)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t _W	Clock High Clear, Set Pulse Width	25			ns	V _{CC} = 5.0 V
t _S	Data Setup Time — HIGH LOW	20			ns	
		20			ns	
t _H	Hold time	5.0			ns	