

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		INP	OUTPUTS			
OPERATING MODE	SD	CD	J	к	Q	Q
Set	L	Н	Х	Х	Н	L
Reset (Clear)	н	L	Х	Х	L	н
*Undetermined	L	L	Х	Х	н	н
Load "1" (Set)	н	н	h	h	н	L
Hold	н	н	I.	h	q	q
Toggle	н	н	h	1	q	q
Load "0" (Reset)	Н	Н	Ι	Ι	L	Н

* Both outputs will be <u>HI</u>GH 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, I = LOW Voltage Level
- X = Don't Care

I, 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





SN54/74LS109A

GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Тур	Мах	Unit
VCC	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
Т _А	Operating Ambient Temperature Range	54 74	-55 0	25 25	125 70	°C
IOH	Output Current — High	54, 74			-0.4	mA
IOL	Output Current — Low	54 74			4.0 8.0	mA

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

			Limits					
Symbol	Parameter		Min	Тур	Max	Unit	Test Conditions	
VIH	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage for All Inputs	
V		54			0.7	v	Guaranteed Input	LOW Voltage for
VIL	Input LOW Voltage	74			0.8	v	All Inputs	
VIK	Input Clamp Diode Voltage	e		-0.65	-1.5	V	$V_{CC} = MIN, I_{IN} =$	- 18 mA
Vou	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	
VOH	Output mon voltage	74	2.7	3.5		V		
Mai		54, 74		0.25	0.4	V	I _{OL} = 4.0 mA V _{CC} = V _{CC} MIN, I _{OL} = 8.0 mA V _{IN} = V _{IL} or V _{IH} per Truth Table	
VOL	Output LOW Voltage	74		0.35	0.5	V		
IIH	Input_HIGH Current J, K, Clock Set, Clear	•			20 40	μΑ	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	
IIL	Input <u>L</u> OW Current J, K, Clock Set, Clear				-0.4 -0.8	mA	$V_{CC} = MAX, V_{IN} = 0.4 V$	
IOS	Output Short Circuit Currer	nt (Note 1)	-20		-100	mA	V _{CC} = MAX	
ICC	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)

		Limits					
Symbol	Parameter	Min	Тур	Max	Unit	Test Conditions	
fMAX	Maximum Clock Frequency	25	33		MHz		
^t PLH	Clock, Clear, Set to Output		13	25	ns	V _{CC} = 5.0 V C _I = 15 pF	
^t PHL	Clock, Clear, Set to Output		25	40	ns	- <u>-</u>	

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

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

Case 751B-03 D Suffix **16-Pin Plastic** SO-16



Case 648-08 N Suffix **16-Pin Plastic**





- NOTES: 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER. DIMENSION A AND B DO NOT INCLUDE MOLD 2 3.
- PROTRUSION. MAXIMUM MOLD PROTRUSION 0.15 (0.006) 4.
- PER SIDE. 751B-01 IS OBSOLETE, NEW STANDARD 751B-03. 5.

	MILLIM	ETERS	INC	HES
DIM	MIN MAX		MIN	MAX
Α	9.80	10.00	0.386	0.393
В	3.80	4.00	0.150	0.157
С	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27	BSC	0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
М	0°	7 °	0°	7°
Р	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- 2.
- CONTROLLING DIMENSION: INCH. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL. 3.
- DIMENSION "B" DOES NOT INCLUDE MOLD 4. FLASH.
- 5.
- ROUNDED CORNERS OPTIONAL. 648-01 THRU -07 OBSOLETE, NEW STANDARD 6. 648-08.

	MILLIM	ETERS	INC	HES	
DIM	MIN	MAX	MIN	MAX	
Α	18.80	19.55	0.740	0.770	
В	6.35	6.85	0.250	0.270	
С	3.69	4.44	0.145	0.175	
D	0.39	0.53	0.015	0.021	
F	1.02	1.77	0.040	0.070	
G	2.54	BSC	0.100 BSC		
н	1.27	BSC	0.050 BSC		
J	0.21	0.38	0.008	0.015	
ĸ	2.80	3.30	0.110	0.130	
L	7.50	7.74	0.295	0.305	
М	0°	10°	0°	10°	
S	0.51	1.01	0.020	0.040	

- NOTES: 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982. 2. CONTROLLING DIMENSION: INCH. 3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL 4. DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY. 5. 620-01 THRU -08 OBSOLETE, NEW STANDARD 620-09.

- 620-09.

	MILLIM	ETERS	INCHES		
DIM	MIN MAX		MIN	MAX	
Α	19.05	19.55	0.750	0.770	
В	6.10	7.36	0.240	0.290	
С	_	4.19	—	0.165	
D	0.39	0.53	0.015	0.021	
E	1.27	BSC	0.050 BSC		
F	1.40	1.77	0.055	0.070	
G	2.54	BSC	0.100	BSC	
J	0.23	0.27	0.009	0.011	
K	_	5.08	_	0.200	
L	7.62	7.62 BSC		BSC	
M	0°	15°	0°	15°	
N	0.39	0.88	0.015	0.035	

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