MOTOROLA

Product Preview

DUAL JK NEGATIVE EDGE-TRIGGERED FLIP-FLOP

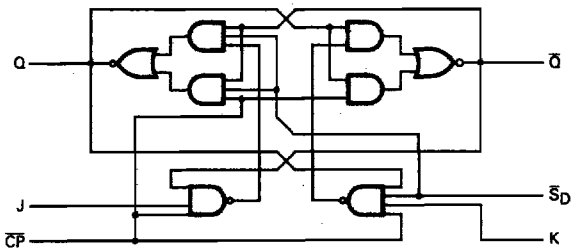
MC54F/74F113

DESCRIPTION — MC54F/74F113 offers individual J, K, Set and Clock inputs. When the clock goes HIGH the inputs are enabled and data may be entered. The logic level of the J and K inputs may be changed when the clock pulse is in either state and the bistable will perform according to the Truth Table as long as minimum setup and hold times are observed. Input data is transferred to the outputs on the falling edge of the clock pulse.

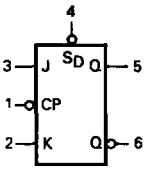
DUAL JK
EDGE-TRIGGERED FLIP-FLOP

FAST™ SCHOTTKY TTL

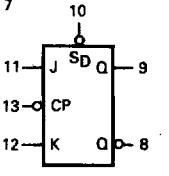
LOGIC DIAGRAM (one half shown)



LOGIC SYMBOL



V_{CC} = Pin 14
GND = Pin 7



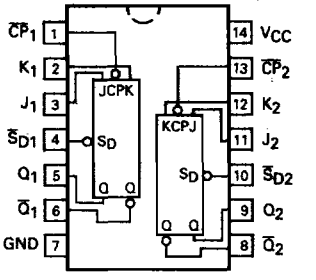
TRUTH TABLE

INPUTS		OUTPUT
@ t_n		@ $t_n + 1$
J	K	Q
L	L	Q_n
L	H	L
H	L	H
H	H	$\overline{Q}_n$

Asynchronous Inputs:
LOW input to $\overline{S}_D$ sets Q to HIGH level
Set is independent of clock

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

CONNECTION DIAGRAM



J Suffix — Case 632-08 (Ceramic)
N Suffix — Case 646-06 (Plastic)
D Suffix — Case 751A-02 (SOIC)

GUARANTEED OPERATING RANGES

SYMBOL	PARAMETER		MIN	TYP	MAX	UNIT
V_{CC}	Supply Voltage*	54, 74	4.50	5.0	5.50	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

*74F devices may be operated over the 4.5 to 5.5 V supply range where they will meet the specifications of 54F devices over the 0° to 70°C temperature range.

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

SYMBOL	PARAMETER		LIMITS MIN	LIMITS TYP	LIMITS MAX	UNITS	TEST CONDITIONS	
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} = 4.5 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_{CC} = MAX, V_{IN} = 2.7 V	
					100	μA	V_{CC} = MAX, V_{IN} = 7.0 V	
I_{IL}	Input LOW Current (J and K Inputs)				−0.6	mA	V_{CC} = MAX, V_{IN} = 0.5 V	
	($\overline{CP}$ Inputs)				−2.4	mA		
	($\overline{C}_D$ and $\overline{S}_D$ Inputs)				−3.0	mA		
I_{OS}	Output Short Circuit Current (Note 2)		−60		−150	mA	V_{CC} = MAX, V_{OUT} = 0 V	
I_{CC}	Power Supply Current			12	19	mA	V_{CC} = MAX, V_{CP} = 0 V	

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

AC CHARACTERISTICS

SYMBOL	PARAMETER	54/74F T_A = +25°C, V_{CC} = +5.0 V, C_L = 50 pF MIN	54/74F MAX	54F T_A = −55 to +125°C, V_{CC} = 5.0 V ±10%, C_L = 50 pF MIN	54F MAX	74F T_A = 0 to +70°C, V_{CC} = 5.0 V ±10%, C_L = 50 pF MIN	74F MAX	UNITS
f_{max}	Maximum Clock Frequency	110						MHz
t_{PLH} t_{PHL}	Propagation Delay $\overline{CP}_n$ to Q_n or $\overline{Q}_n$	2.0 2.0	6.0 6.0			2.0 2.0	7.0 7.0	ns
t_{PLH} t_{PHL}	Propagation Delay $\overline{S}_{Dn}$ to Q_n or $\overline{Q}_n$	2.0 2.0	6.5 6.5			2.0 2.0	7.5 7.5	ns

AC OPERATING REQUIREMENTS

SYMBOL	PARAMETER	54/74F $T_A = +25°C$ $V_{CC} = +5.0$ V			54F $T_A = -55$ to $+125°C$ $V_{CC} = 5.0$ V ±10%		74F $T_A = 0$ to $+70°C$ $V_{CC} = 5.0$ V ±10%		UNITS
		MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_s (H) t_s (L)	Set up Time, HIGH or LOW J_n or K_n to $\overline{CP}_n$	4.0 3.0					4.0 3.0		ns
t_h (H) t_h (L)	Hold Time, HIGH or LOW J_n or K_n to $\overline{CP}_n$	0 0					0 0		
t_w (H) t_w (L)	$\overline{CP}_n$ Pulse Width, HIGH or LOW	4.5 4.5					4.5 4.5		ns
t_w (L)	$\overline{S}_{Dn}$ Pulse Width LOW	4.5					4.5		ns
t_{rec}	Recovery Time $\overline{S}_{Dn}$ to $\overline{CP}$	4.0					5.0		ns

AC TEST CIRCUIT

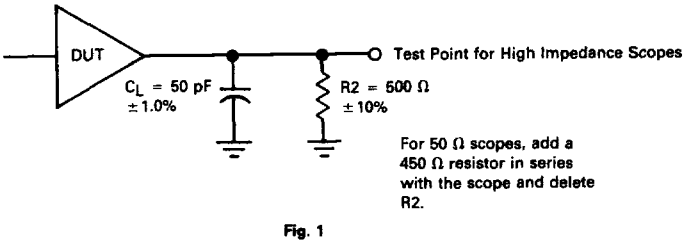


Fig. 1