signetics DUAL J-K EDGE-TRIGGERED FLIP-FLOP

S54H106
N74H106

S54H106–B,F,W • N54H106–B,F

DIGITAL 54/74 TTL SERIES

DESCRIPTION

These dual monolithic J-K flip-flops are negative edge-triggered. They feature individual J, K, clock, and asynchronous preset and clear inputs to each flip-flop. When the clock goes high, the inputs are enabled and data will be accepted. Logical state of J and K inputs may be allowed to change when the clock pulse is in a high state and bistable will perform according to the truth table as long as minimum set-up times are observed. Input data is transferred to the outputs on the negative edge of the clock pulse.

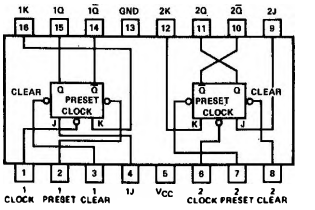
TRUTH TABLE

t_n		t_{n+1}
J	K	Q
0	0	Q_n
0	1	0
1	0	1
1	1	$\overline{Q}_n$

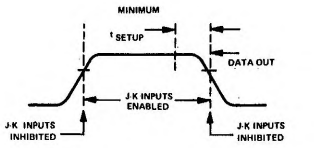
NOTES:
1. t_n = Bit time before clock pulse.
2. t_{n+1} = Bit time after clock pulse.

PIN CONFIGURATION

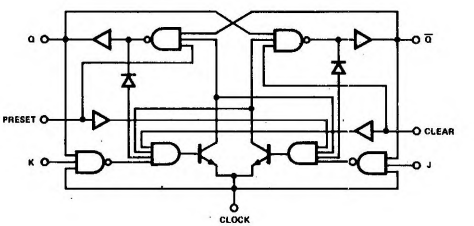
B,F,W PACKAGE



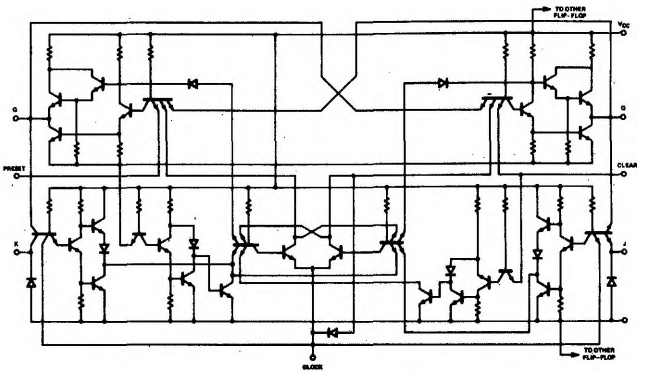
CLOCK WAVEFORM



BLOCK DIAGRAM (each flip-flop)



SCHEMATIC DIAGRAM (each flip-flop)



RECOMMENDED OPERATING CONDITIONS

		MIN	NOM	MAX	UNIT
Supply Voltage V_{CC}: S54H106 Circuits		4.5	5	5.5	V
N74H106 Circuits		4.75	5	5.25	V
Operating Free-Air Temperature Range, T_A:	S54H106 Circuits	-55	25	125	°C
	N74H106 Circuits	0	25	70	°C
Normalized Fan-Out From Each Output, N				10	
Width of Clock Pulse, $t_{p(clock)}$		10			ns
Width of Preset Pulse, $t_{p(preset)}$		16			ns
Width of Clear Pulse, $t_{p(clear)}$		16			ns
Input Setup Time, t_{setup} (See Above):	Logical 1	10			ns
	Logical 0	13			ns
Input Hold Time, t_{hold}		0			ns
Clock Pulse Transition Time, t_0				150	ns

ELECTRICAL CHARACTERISTICS (over recommended operating free-air temperature range unless otherwise noted)

PARAMETER		TEST CONDITIONS†		MIN	TYP§	MAX	UNIT
$V_{in(1)}$	Input voltage required to ensure logical 1 at any input terminal			2			V
$V_{in(0)}$	Input voltage required to ensure logical 0 at any input terminal					0.8	V
$V_{out(1)}$	Logical 1 output voltage	V_{CC} = MIN,	I_{load} = 500 μA	2.4	3.2		V
$V_{out(0)}$	Logical 0 output voltage	V_{CC} = MIN,	I_{sink} = 20 mA		0.25	0.4	V
$I_{in(0)}$	Logical 0 level input current at J, K, preset, or clear	V_{CC} = MAX,	V_{in} = 0.4 V		-1	-2	mA
$I_{in(0)}$	Logical 0 level input current at clock	V_{CC} = MAX,	V_{in} = 0.4 V		-3	-4.8	mA
$I_{in(1)}$	Logical 1 level input current at	V_{CC} = MAX,	V_{in} = 2.4 V			50	μA
	J or K	V_{CC} = MAX,	V_{in} = 5.5 V			1	mA
$I_{in(1)}$	Logical 1 level input current at	V_{CC} = MAX,	V_{in} = 2.4 V			100	μA
	present or clear	V_{CC} = MAX,	V_{in} = 5.5 V			1	mA
$I_{in(1)}$	Logical 1 level input current at	V_{CC} = MAX,	V_{in} = 2.4 V	0		-1	mA
	clock	V_{CC} = MAX,	V_{in} = 5.5 V			1	mA
I_{OS}	Short-circuit output current‡	V_{CC} = MAX,	V_{in} = 0	-40		-100	mA
I_{CC}	Supply current	V_{CC} = MAX			40	76	mA

†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.
‡Not more than one output should be shorted at a time, and duration of short-circuit test should not exceed 1 second.
§All typical values are at V_{CC} = 5 V, T_A = 25°C.

SWITCHING CHARACTERISTICS, V_{CC} = 5 V, T_A = 25°C, N = 10

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
f_{clock}	Maximum input clock frequency	C_L = 25 pF,	R_L = 280 Ω	40	50		MHz
t_{pd1}	Propagation delay time to logical 1 level from preset or clear to output	C_L = 25 pF,	R_L = 280 Ω		8	12	ns
t_{pd0}	Propagation delay time to logical 0 level from preset or clear to output (clock low)	C_L = 25 pF,	R_L = 280 Ω		23	35	ns
t_{pd0}	Propagation delay time to logical 0 level from preset or clear to output (clock high)	C_L = 25 pF,	R_L = 280 Ω		15	20	ns
t_{pd1}	Propagation delay time to logical 1 level from clock to output	C_L = 25 pF,	R_L = 280 Ω	5	10	15	ns
t_{pd0}	Propagation delay time to logical 0 level from clock to output	C_L = 25 pF,	R_L = 280 Ω	8	16	20	ns