

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

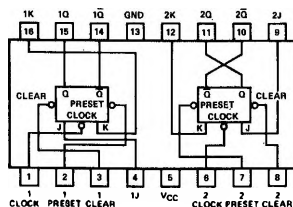
t_n		t_{n+1}
J	K	Q
0	0	Q_n
0	1	0
1	0	1
1	1	$\bar{Q}_n$

NOTES:

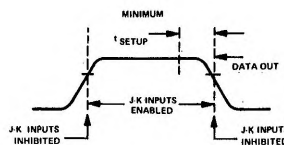
1. t_n = Bit time before clock pulse.
2. t_{n+1} = Bit time after clock pulse.

PIN CONFIGURATION

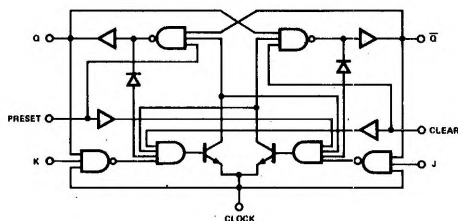
B,F,W PACKAGE



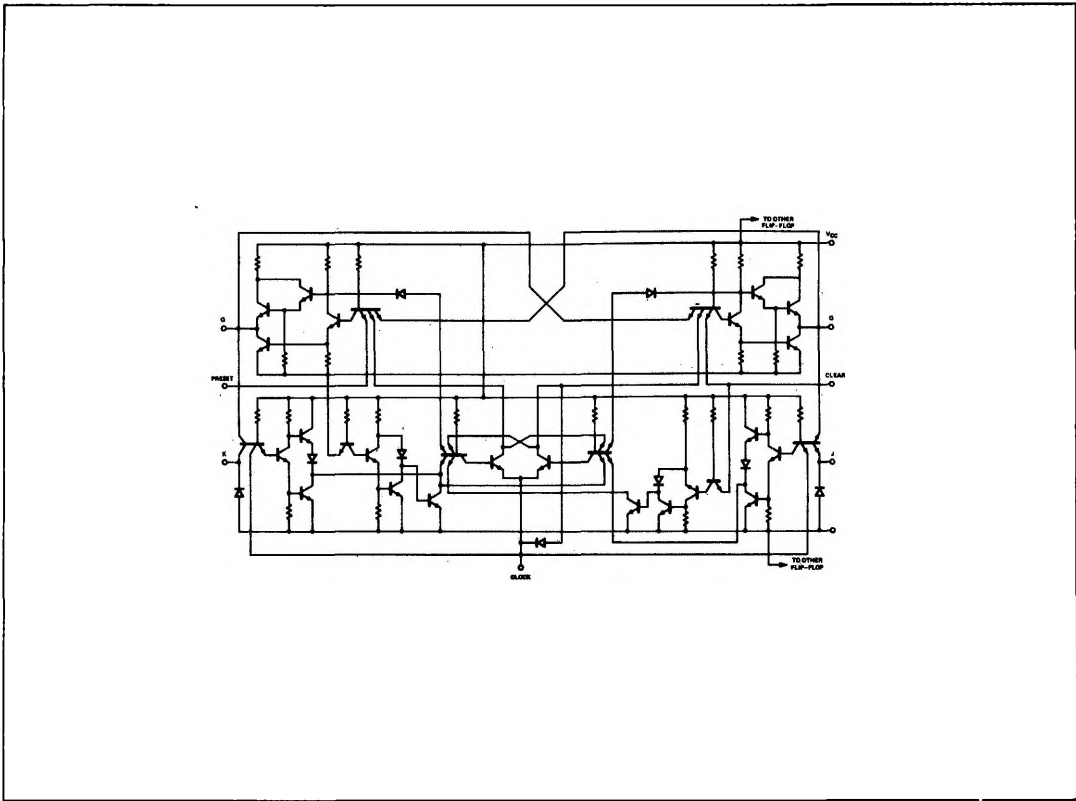
CLOCK WAVEFORM



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, $t_{p(\text{clock})}$	10			ns
Width of Preset Pulse, $t_{p(\text{preset})}$	16			ns
Width of Clear Pulse, $t_{p(\text{clear})}$	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_{q}			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	$V_{CC} = \text{MIN}, I_{load} = 500 \mu\text{A}$	2.4	3.2		V
$V_{out(0)}$ Logical 0 output voltage	$V_{CC} = \text{MIN}, I_{sink} = 20 \text{ mA}$		0.25	0.4	V
$I_{in(0)}$ Logical 0 level input current at J, K, preset, or clear	$V_{CC} = \text{MAX}, V_{in} = 0.4 \text{ V}$		-1	-2	mA
$I_{in(0)}$ Logical 0 level input current at clock	$V_{CC} = \text{MAX}, V_{in} = 0.4 \text{ V}$		-3	-4.8	mA
$I_{in(1)}$ Logical 1 level input current at J or K	$V_{CC} = \text{MAX}, V_{in} = 2.4 \text{ V}$			50	μA
	$V_{CC} = \text{MAX}, V_{in} = 5.5 \text{ V}$			1	mA
$I_{in(1)}$ Logical 1 level input current at present or clear	$V_{CC} = \text{MAX}, V_{in} = 2.4 \text{ V}$			100	μA
	$V_{CC} = \text{MAX}, V_{in} = 5.5 \text{ V}$			1	mA
$I_{in(1)}$ Logical 1 level input current at clock	$V_{CC} = \text{MAX}, V_{in} = 2.4 \text{ V}$	0		-1	mA
	$V_{CC} = \text{MAX}, V_{in} = 5.5 \text{ V}$			1	mA
I_{OS} Short-circuit output current‡	$V_{CC} = \text{MAX}, V_{in} = 0$	-40		-100	mA
I_{CC} Supply current	$V_{CC} = \text{MAX}$		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 $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

SWITCHING CHARACTERISTICS, $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$, $N = 10$

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