

# DUAL J-K MASTER-SLAVE FLIP-FLOP

# S54H76 N74H76

S54H76-B • N74H76-B

DIGITAL 54/74 TTL SERIES

## DESCRIPTION

These dual J-K flip-flops are based on the master-slave principle. Inputs to the master section are controlled by the clock pulse. The clock pulse also regulates the circuitry which connects the master and slave sections. The sequence of operation is as follows:

1. Isolate slave from master
2. Enter information from J and K inputs to master
3. Disable J and K inputs
4. Transfer information from master to slave.

Logical state of J and K inputs must not be allowed to change when the clock pulse is in a high state.

## TRUTH TABLE

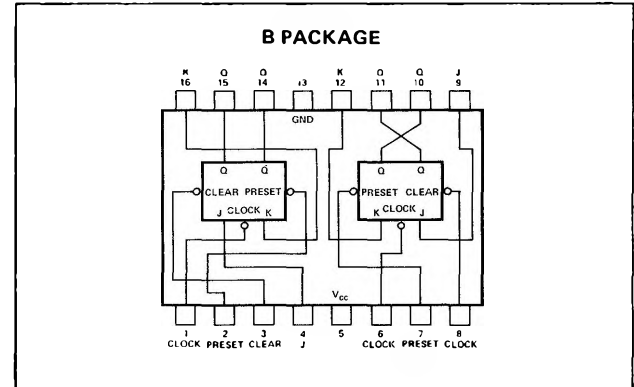
### LOGIC

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

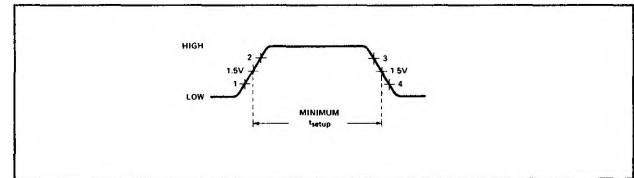
### NOTES:

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

## PIN CONFIGURATIONS



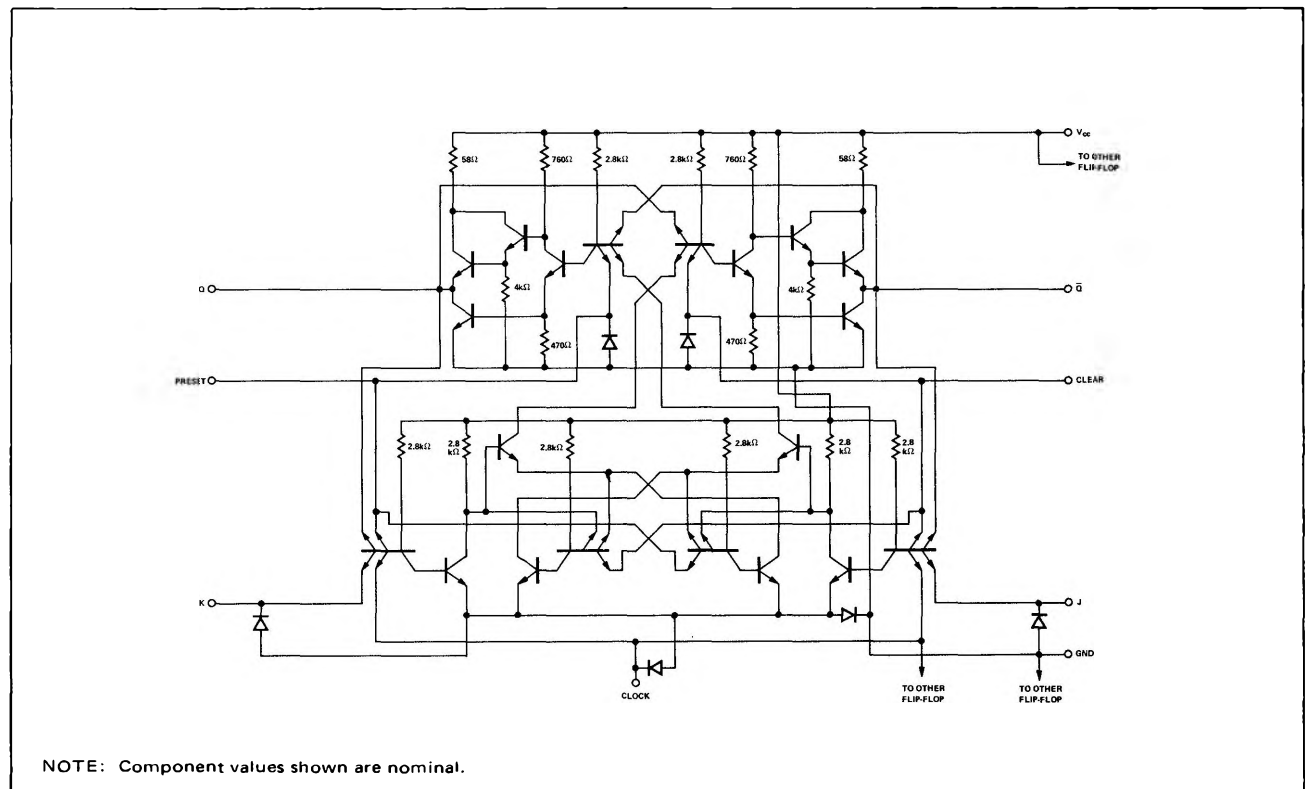
## CLOCK WAVEFORM



## POSITIVE LOGIC

Low input to preset sets Q to logical 1  
 Low input to clear sets Q to logical 0  
 Clear and preset are independent of clock

## SCHEMATIC (each flip-flop)



NOTE: Component values shown are nominal.

**SIGNETICS DIGITAL 54/74 TTL SERIES - S54H76 • N74H76**

**RECOMMENDED OPERATING CONDITIONS**

	MIN	NOM	MAX	UNIT
Supply Voltage $V_{CC}$ : S54H76 Circuits	4.5	5	5.5	V
N74H76 Circuits	4.75	5	5.25	V
Operating Free-Air Temperature Range, $T_A$ : S54H76 Circuits	-55	25	125	°C
N74H76 Circuits	0	25	70	°C
Normalized Fan-Out from each Output, N			10	
Width of Clock Pulse, $t_p(\text{clock})$	12			ns
Width of Preset Pulse, $t_p(\text{preset})$	16			ns
Width of Clear Pulse, $t_p(\text{clear})$	$\geq t_p(\text{clock})$			
Input Setup Time, $t_{\text{setup}}$ (See above)				
Input Hold Time, $t_{\text{hold}}$	0			

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

PARAMETER	TEST CONDITIONS*	MIN	TYP <sup>†</sup>	MAX	UNIT
$V_{in(1)}$	Input voltage required to ensure logical 1 at any input terminal	$V_{CC} = \text{MIN}$	2		V
$V_{in(0)}$	Input voltage required to ensure logical 0 at any input terminal	$V_{CC} = \text{MIN}$		0.8	V
$V_{out(1)}$	Logical 1 output voltage	$V_{CC} = \text{MIN}$ , $I_{\text{load}} = -500\mu\text{A}$	2.4		V
$V_{out(0)}$	Logical 0 output voltage	$V_{CC} = \text{MIN}$ , $I_{\text{sink}} = 20\text{mA}$		0.4	V
$I_{in(0)}$	Logical 0 level input current at J, K, or clock	$V_{CC} = \text{MAX}$ , $V_{in} = 0.4\text{V}$		-2	mA
$I_{in(0)}$	Logical 0 level input current at clear or preset	$V_{CC} = \text{MAX}$ , $V_{in} = 0.4\text{V}$		-4	mA
$I_{in(1)}$	Logical 1 level input current at J,K, or clock	$V_{CC} = \text{MAX}$ , $V_{in} = 2.4\text{V}$		50	$\mu\text{A}$
$I_{in(1)}$	Logical 1 level input current at J,K, or clock	$V_{CC} = \text{MAX}$ , $V_{in} = 5.5\text{V}$		1	mA
$I_{in(1)}$	Logical 1 level input current at clear or preset	$V_{CC} = \text{MAX}$ , $V_{in} = 2.4\text{V}$		100	$\mu\text{A}$
$I_{in(1)}$	Logical 1 level input current at clear or preset	$V_{CC} = \text{MAX}$ , $V_{in} = 5.5\text{V}$		1	mA
$I_{OS}$	Short circuit output current**	$V_{CC} = \text{MAX}$ , $V_{in} = 0$	-40	-100	mA
$I_{CC}$	Supply current	$V_{CC} = \text{MAX}$ , $V_{in} = 4.5\text{V}$	32	50	mA

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
$f_{\text{clock}}$	Maximum clock frequency	$C_L = 25\text{pF}$ , $R_L = 280\Omega$	25	30	MHz	
$t_{pd1}$	Propagation delay time to logical 1 level from clear or preset to output	$C_L = 25\text{pF}$ , $R_L = 280\Omega$		6	13	ns
$t_{pd0}$	Propagation delay time to logical 0 level from clear or preset to output	$C_L = 25\text{pF}$ , $R_L = 280\Omega$		12	24	ns
$t_{pd1}$	Propagation delay time to logical 1 level from clock to output	$C_L = 25\text{pF}$ , $R_L = 280\Omega$		16	21	ns
$t_{pd0}$	Propagation delay time to logical 0 level from clock to output	$C_L = 25\text{pF}$ , $R_L = 280\Omega$		22	27	ns

\* For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

† All typical values are at  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ .

\*\* Not more than one output should be shorted at a time.