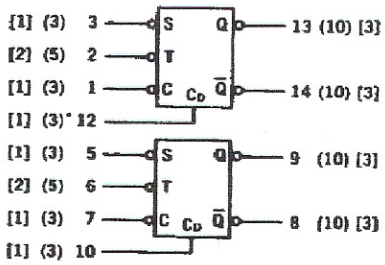
MC790P • MC890P

Two J-K flip-flops in a single package. Each flip-flop has a direct clear input in addition to the clocked inputs.



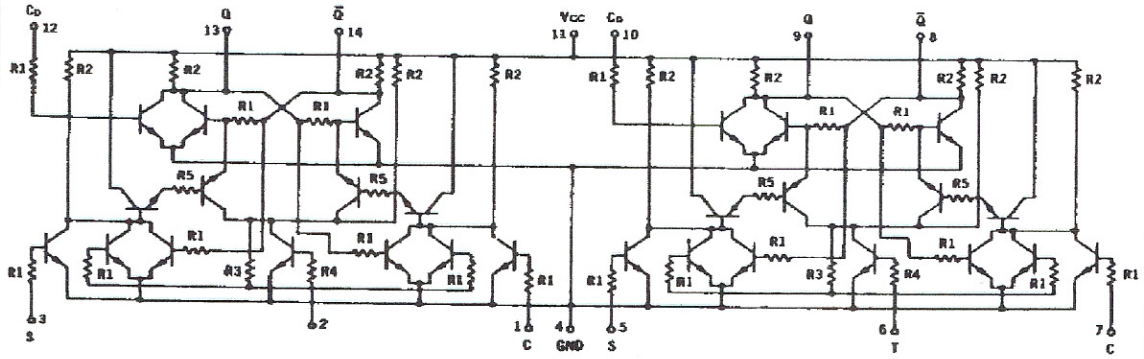
$f_{Tog} = 4$ MHz
$P_D = 182$ mW (Only Clock Input High)
158 (Inputs Low)

CLOCKED INPUT OPERATION ①

t_n ②		t_{n+1} ②	
S	C	Q	$\bar{Q}$
1	1	Q_n ③	$\bar{Q}_n$
1	0	1	0
0	1	0	1
0	0	$\bar{Q}_n$	Q_n ③

1. Direct input (C_D) must be low.
2. The time period prior to the negative transition of the clock pulse is denoted t_n and the time period subsequent to this transition is denoted t_{n+1}.
3. Q_n is the state of the Q output in the time period t_n.
4. Clock pulse fall time must be < 100 ns.

NUMBER IN PARENTHESES INDICATES LOADING FACTOR FOR mW MRTL
NUMBER IN BRACKETS INDICATES LOADING FACTOR FOR MRTL



TYPICAL RESISTANCE VALUES
R1 = 450 Ω R3 = 510 Ω
R2 = 640 Ω R4 = 225 Ω
R5 = 300 Ω

ELECTRICAL CHARACTERISTICS

Test procedures are shown for one flip-flop only.
The other flip-flop is tested in the same manner.

	@ Test Temperature	TEST VOLTAGE VALUES (Volts) V_{in}	V_{on}	V_{out}	V_{off}	V_{cc}
MC890P	0°C	0.960	0.930	1.80	0.570	3.60
MC890P	+25°C	0.910	0.880	1.80	0.500	3.60
MC890P	+75°C	0.820	0.790	1.80	0.450	3.60
MC790P	+15°C	0.865	0.865	1.80	0.475	3.60
MC790P	+25°C	0.850	0.850	1.80	0.460	3.60
MC790P	+55°C	0.800	0.800	1.80	0.430	3.60

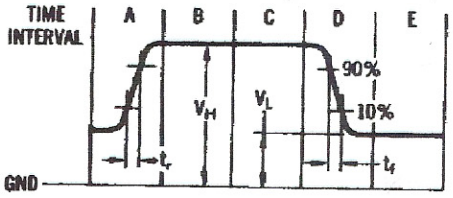
Characteristic	Symbol	Pin Under Test	MC890P Test Limits 0°C Min	0°C Max	+25°C Min	+25°C Max	+75°C Min	+75°C Max	Unit	MC790P Test Limits +15°C Min	+15°C Max	+25°C Min	+25°C Max	+55°C Min	+55°C Max	Unit	TEST VOLTAGE APPLIED TO PINS LISTED BELOW: V_{in}	V_{on}	V_{out}	V_{off}	V_{cc}	Gnd
Input Current	I_{in}	1	-	600	-	600	-	570	μAdc	-	500	-	500	-	470	μAdc	1	-	13	-	11	2, 3, 4, 12
	$2I_{in}$	2	-	1200	-	1200	-	1140		-	1000	-	1000	-	940		2	-	1, 3	-		4, 12
	I_{in}	3	-	600	-	600	-	570		-	500	-	500	-	470		3	-	14	-		1, 2, 4, 12
	I_{in}	12	-	600	-	600	-	570		-	500	-	500	-	470		12	-	14	-		1, 2, 3, 4
Output Current	I_{A3}	13	1.80	-	1.80	-	1.71	-	mAdc	1.65	-	1.65	-	1.56	-	mAdc	-	13	1	12	11	2, 3, 4
		14		-		-		-			-		-		-		-	14	3, 12	-		1, 2, 4
		14		-		-		-			-		-		-		-	12, 14	3	-		1, 2, 4
Output Voltage	V_{out}	13	-	500	-	400	-	400	mVdc	-	400	-	300	-	320	mVdc	-	12	-	-	11	1, 2, 3, 4, 14
		13* #	-		-		-			-		-		-			-	1, 3	-	-		4, 12
		13* ##	-		-		-			-		-		-			-	1	-	3		
		13* ##	-		-		-			-		-		-			-	-	-	1, 3		
		14* ##	-		-		-			-		-		-			-	1, 3	-	-		
		14* #	-		-		-			-		-		-			-	3	-	1		
		14* #	-		-		-			-		-		-			-	-	-	1, 3		
Saturation Voltage	$V_{CE(sat)}$	13	-	400	-	300	-	350	mVdc	-	300	-	290	-	320	mVdc	-	-	12	-	11	1, 2, 3, 4, 14
		13#	-		-		-			-		-		-			-	-	-	-		1, 2, 3, 4, 12
		14##	-		-		-			-		-		-			-	-	12	-		1, 2, 3, 4

Ground unused input pins. Other pins not listed are left open.

* Clock pulse to pin 2, see Figure 1,

\# Pin 13 = LOW
Pin 14 = LOW
} Set by a momentary ground prior to the application of the negative-going Clock Pulse.

FIGURE 1 — CLOCK PULSE DEFINITION



SEQUENCE OF EVENTS

A. Voltage applied to Clock pin is raised to V_H. t_r is not critical but should be < 1.0 μs.
B. Biases of all other inputs are applied. V_{CC} is applied without interruption throughout the testing.
C. Apply momentary ground (when applicable).
D. Clock pulse is allowed to fall to V_L. t_f must remain within 10 ns minimum and 100 ns maximum.
E. Electrical measurements are read out. Load current over-shoot must be limited to 10% or the flip-flop may be tripped and the wrong output conditions occur.

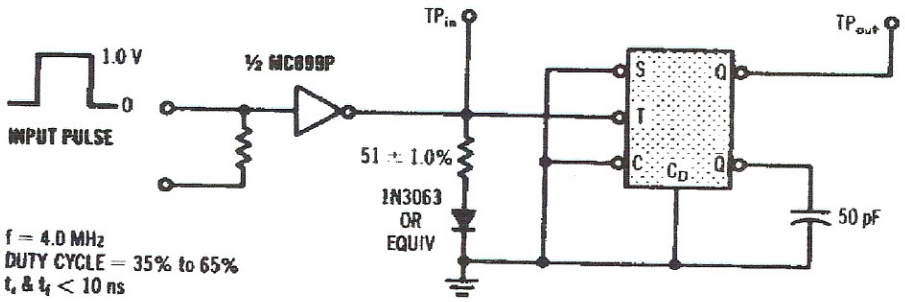
MC890P

T_A	V_L	V_H
+ 25°C	+0.500 V ± 2.0 mV	+0.930 V ± 2.0 mV
0°C	+0.570 V ± 2.0 mV	+0.980 V ± 2.0 mV
+ 75°C	+0.450 V ± 2.0 mV	+0.840 V ± 2.0 mV

MC790P

T_A	V_L	V_H
+ 25°C	+ 0.460 V ± 2.0 mV	+0.900 V ± 2.0 mV
+ 15°C	+ 0.475 V ± 2.0 mV	+0.915 V ± 2.0 mV
+ 55°C	+ 0.430 V ± 2.0 mV	+0.850 V ± 2.0 mV

FIGURE 2 — TOGGLE MODE TEST CIRCUIT



FREQUENCY AT TP_{out} SHOULD BE ½ THE FREQUENCY AT TP_{in}