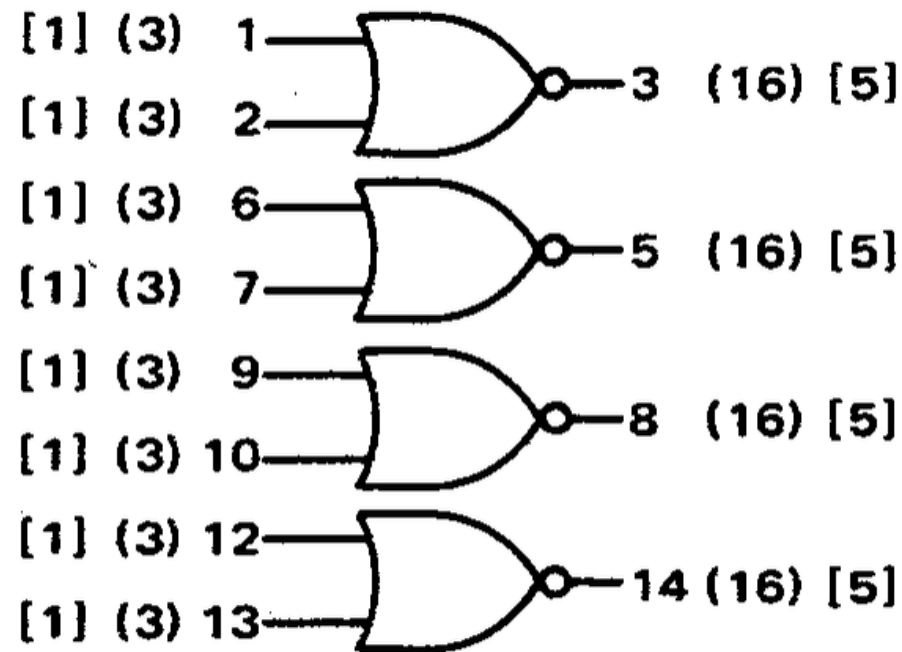


MC724P • MC824P

Quad 2-Input Gate



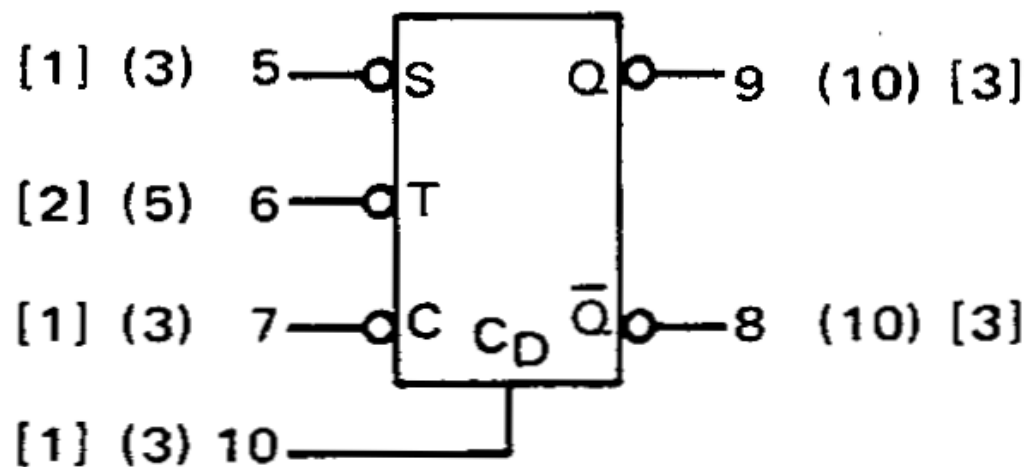
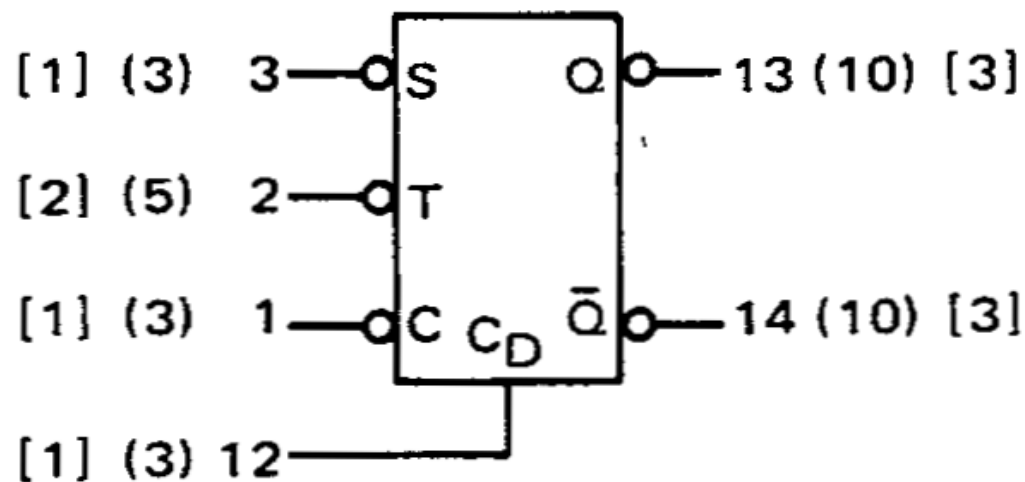
$$3 = \overline{1 + 2}$$

$$t_{pd} = 12 \text{ ns}$$

$$P_D = 100 \text{ mW (Input High)}$$

$$30 \text{ mW (Inputs Low)}$$

MC790P • MC890P Dual J-K Flip-Flop



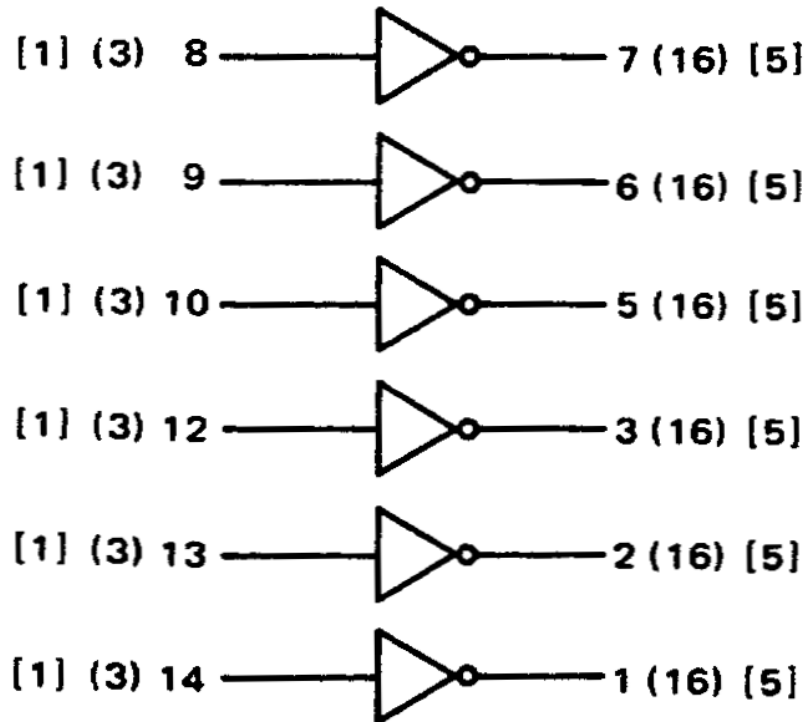
$$f_{Tog} = 4 \text{ MHz}$$

$$P_D = 182 \text{ mW (Only Clock Input High)}$$

$$158 \text{ mW (Inputs Low)}$$

INVERTER

MC789P • MC889P Hex Inverter



$t_{pd} = 12 \text{ ns}$

$1 = \overline{14}$

$P_D = 130 \text{ mW (Input High)}$

$15 \text{ mW (Inputs Low)}$

ELECTRICAL CHARACTERISTICS

Test procedures are shown for one gate only.
The other gates are tested in the same manner.

		TEST VOLTAGE VALUES				
		(Volts)				
@ Test Temperature		V _{in}	V _{on}	V _{BOT}	V _{off}	V _{CC}
		MC824P	0°C	0.960	0.930	1.80
+25°C	0.910		0.880	1.80	0.500	3.60
+75°C	0.820		0.790	1.80	0.450	3.60
MC724P	+15°C	0.865	0.865	1.80	0.475	3.60
	+25°C	0.850	0.850	1.80	0.460	3.60
	+55°C	0.800	0.800	1.80	0.430	3.60

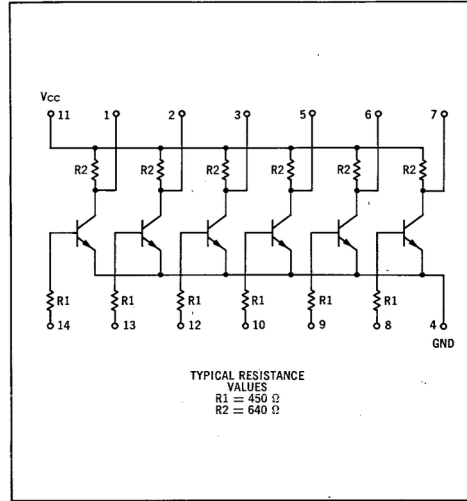
Characteristic	Symbol	Pin Under Test	MC824P Test Limits						MC724P Test Limits						TEST VOLTAGE APPLIED TO PINS LISTED BELOW:					Gnd		
			0°C		+25°C		+75°C		+15°C		+25°C		+55°C		V _{in}	V _{on}	V _{BOT}	V _{off}	V _{CC}			
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max							Unit	
Input Current	I _{in}	1	-	600	-	600	-	570	μA _{dc}	-	500	-	500	-	470	μA _{dc}	1	-	2	-	11	4
		2	-	600	-	600	-	570	μA _{dc}	-	500	-	500	-	470	μA _{dc}	2	-	1	-	11	4
Output Current	I _{A5}	3	3.0	-	3.0	-	2.85	-	mA _{dc}	2.65	-	2.65	-	2.50	-	mA _{dc}	-	3	-	1, 2	11	4
Output Voltage	V _{out}	3	-	500	-	400	-	400	mV _{dc}	-	400	-	300	-	320	mV _{dc}	-	1	-	-	11	2, 4
		3	-	500	-	400	-	400	mV _{dc}	-	400	-	300	-	320	mV _{dc}	-	2	-	-	11	1, 4
Saturation Voltage	V _{CE(sat)}	3	-	400	-	300	-	350	mV _{dc}	-	300	-	290	-	320	mV _{dc}	-	-	1	-	11	2, 4
		3	-	400	-	300	-	350	mV _{dc}	-	300	-	290	-	320	mV _{dc}	-	-	2	-	11	1, 4
Switching Time	t _{on} + t _{off}	1, 3	-	-	-	48	-	-	ns	-	-	-	48	-	-	ns	Pulse In	Pulse Out	-	-	11	2, 4
			1	3	-	-	11	2, 4														

Ground input pins of gates not under test. Other pins not listed are left open.

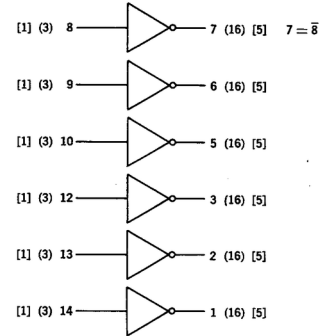
HEX INVERTERS

PLASTIC MRTL MC700P/800P series

MC789P • MC889P



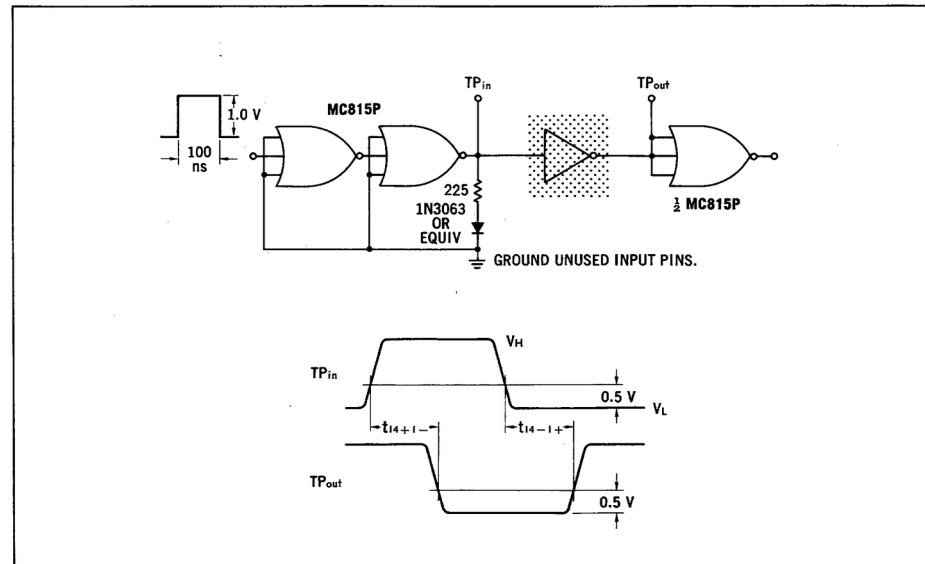
Six individual circuits are contained in a single package. Each provides the simple inversion function.



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

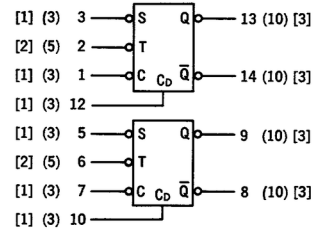
$t_{pd} = 12 \text{ ns}$
 $P_D = 130 \text{ mW}$ (Input High)
 15 mW (Inputs Low)

SWITCHING TIMES TEST CIRCUIT AND WAVEFORMS



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.



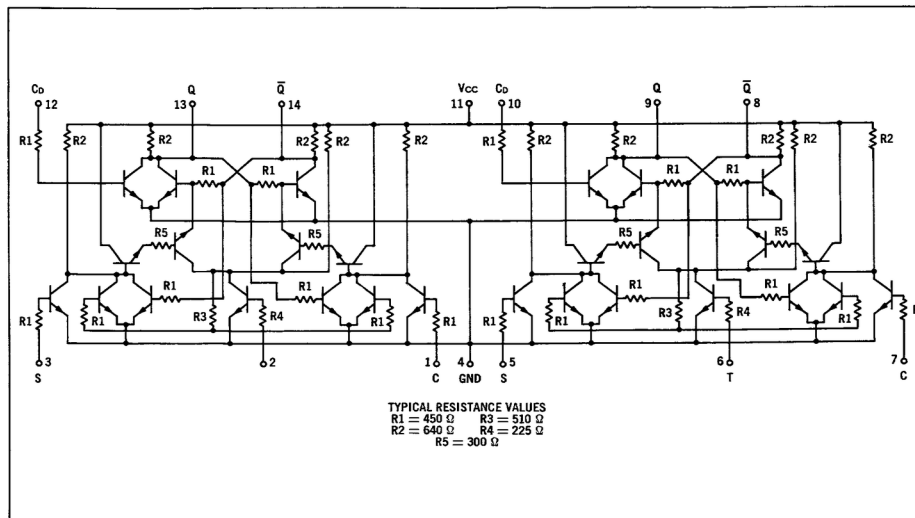
$f_{\text{rog}} = 4 \text{ MHz}$
 $P_d = 182 \text{ mW}$ (Only Clock Input High)
158 (Inputs Low)

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

CLOCKED INPUT OPERATION ①

t_n ②		t_{n+1} ③	
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

- Direct input (C_D) must be low.
- 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} .
- Q_n is the state of the Q output in the time period t_n .
- Clock pulse fall time must be $< 100 \text{ ns}$.



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

Characteristic	Symbol	Pin Under Test	MC890P Test Limits						MC790P Test Limits						TEST VOLTAGE APPLIED TO PINS LISTED BELOW:					Gnd		
			0°C		+25°C		+75°C		+15°C		+25°C		+55°C		V _{in}	V _{on}	V _{BOT}	V _{off}	V _{CC}			
			Min	Max	Min	Max	Min	Max	Unit	Min	Max	Min	Max	Unit								
Input Current	I _{in}	1	-	600	-	600	-	570	μA _{dc}	-	500	-	500	-	470	μA _{dc}	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	-	mA _{dc}	1.65	-	1.65	-	1.56	-	mA _{dc}	-	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	mV _{dc}	-	400	-	300	-	320	mV _{dc}	-	12	-	-	11	1, 2, 3, 4, 14
		13*#	-	↓	-	↓	-	↓		-	↓	-	↓	-	↓		-	1, 3	-	-	↓	4, 12
		13*##	-	↓	-	↓	-	↓		-	↓	-	↓	-	↓		-	1	-	3	↓	
		13*###	-	↓	-	↓	-	↓		-	↓	-	↓	-	↓		-	-	-	1, 3	↓	
		14*##	-	↓	-	↓	-	↓		-	↓	-	↓	-	↓		-	1, 3	-	-	↓	
		14*#	-	↓	-	↓	-	↓		-	↓	-	↓	-	↓		-	3	-	1	↓	
Saturation Voltage	V _{CE(sat)}	13	-	400	-	300	-	350	mV _{dc}	-	300	-	290	-	320	mV _{dc}	-	-	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.

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

* Clock pulse to pin 2, see Figure 1,