

**MNMM54HC123A-X REV 1A0**

 Original Creation Date: 10/27/95  
 Last Update Date: 05/19/97  
 Last Major Revision Date: 04/02/97

**DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATOR**
**General Description**

The MM54HC123A high speed monostable multivibrators (one shots) utilize advanced silicon-gate CMOS technology. They feature speeds comparable to low power Schottky TTL circuitry while retaining the low power and high noise immunity characteristic of CMOS circuits.

Each multivibrator features both a negative, A, and a positive, B, transition triggered input, either of which can be used as an inhibit input. Also included is a clear input that when taken low resets the one shot. The 'HC123' can be triggered on the positive transition of the clear while A is held low and B is held high.

The 'HC123A is retriggerable. That is it may be triggered repeatedly while their outputs are generating a pulse and the pulse will be extended.

Pulse width stability over a wide range of temperature and supply is achieved using linear CMOS techniques. The output pulse equation is simple:  $P_w = (R \times C) \ln(2)$ ; where  $P_w$  is in seconds, R is in Ohms, and C is in farads. All inputs are protected from damage due to static discharge by diodes to Vcc and ground.

**Industry Part Number**

MM54HC123A

**NS Part Numbers**

 MM54HC123AE/883\*  
 MM54HC123AJ/883\*\*

**Prime Die**

MM74HC123

**Controlling Document**

5962-86847022A\*,EA\*\*

**Processing**

MIL-STD-883, Method 5004

**Quality Conformance Inspection**

MIL-STD-883, Method 5005

Subgrp	Description	Temp ( °C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

**Features**

- Typical propagation delay: 25nS
- Wide power supply range: 2V-6V
- Low input current: 1uA maximum
- Fanout of 10 LS-TTL loads
- Simple pulse width formula  $T = RC$
- Wide pulse range: 400nS to infinity (typ)
- Part to part variation:  $\pm 5\%$  (typ)
- Schmitt Trigger A & B inputs enable infinite signal input rise and fall times

**(Absolute Maximum Ratings)**

(Note 1, 2)

Supply Voltage (Vcc)	-0.5V to +7.0V
DC Input Voltage (Vin)	-1.5V to Vcc +1.5V
DC Output Voltage (Vout)	-0.5V to Vcc +0.5V
Clamp Diode Current (Iik, Iok)	±20mA
DC Output Current, per pin (Iout)	±25mA
DC Vcc or Gnd Current, per pin (Icc)	±50mA
Storage Temperature Range (Tstg)	-65 C to +150 C
Power Dissipation (Pd)	600mW
(Note 3)	500mW
S.O. Package only	
Lead Temperature (Tl)	260 C
(Soldering, 10 seconds)	

Note 1: Maximum Ratings are those values beyond which damage to the device may occur.

Note 2: Unless otherwise specified all voltages are referenced to ground.

Note 3: Power Dissipation Temperature Derating: Plastic "N" Package: -12mW/ C from 65 C to 85 C, Ceramic "J" Package: -12mW/ C from 100 C to 125 C.

**Recommended Operating Conditions**

Supply Voltage (Vcc)	Min	Max	Units
	2	6	V
DC Input or Output Voltage (Vin, Vout)	Min	Max	Units
	0	Vcc	V
Operating Temperature Range (TA)	Min	Max	Units
	-55	+125	C
Input Rise or Fall Times (Clear Input)	Min	Max	Units
(tr, tf)			
Vcc = 2.0V		1000	nS
Vcc = 4.5V		500	nS
Vcc = 6.0V		400	nS

## Electrical Characteristics

### DC PARAMETERS:

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vih	Logical "1" Input Voltage	Vcc = 2V	1		1.5		V	1, 2, 3
		Vcc = 4.5V	1		3.15		V	1, 2, 3
		Vcc = 6V	1		4.2		V	1, 2, 3
Vil	Logical "0" Input Voltage	Vcc = 2V	1			0.3	V	1, 2, 3
		Vcc = 4.5V	1			0.9	V	1, 2, 3
		Vcc = 6V	1			1.2	V	1, 2, 3
Voh	Logical "1" Output Voltage	Vcc = 2V, Vin = Vih or Vil, Iout ≤ 20uA			1.9		V	1, 2, 3
		Vcc = 4.5V, Vin = Vih or Vil, Iout ≤ 20uA			4.4		V	1, 2, 3
		Vcc = 4.5V, Vin = Vih or Vil, Iout ≤ 4mA			3.98		V	1
		Vcc = 4.5V, Vin = Vih or Vil, Iout ≤ 4mA			3.7		V	2, 3
		Vcc = 6V, Vin = Vih or Vil, Iout ≤ 20uA			5.9		V	1, 2, 3
		Vcc = 6V, Vin = Vih or Vil, Iout ≤ 5.2mA			5.48		V	1
		Vcc = 6V, Vin = Vih or Vil, Iout ≤ 5.2mA			5.2		V	2, 3
Vol	Logical "0" Output Voltage	Vcc = 2V, Vin = Vih or Vil, Iout ≤ 20uA				0.1	V	1, 2, 3
		Vcc = 4.5V, Vin = Vih or Vil, Iout ≤ 20uA				0.1	V	1, 2, 3
		Vcc = 4.5V, Vin = Vih or Vil, Iout ≤ 4mA				0.26	V	1
		Vcc = 4.5V, Vin = Vih or Vil, Iout ≤ 4mA				0.4	V	2, 3
		Vcc = 6V, Vin = Vih or Vil, Iout ≤ 20uA				0.1	V	1, 2, 3
		Vcc = 6V, Vin = Vih or Vil, Iout ≤ 5.2mA				0.26	V	1
		Vcc = 6V, Vin = Vih or Vil, Iout ≤ 5.2mA				0.4	V	2, 3

## Electrical Characteristics

### DC PARAMETERS: (Continued)

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
I <sub>in</sub>	Maximum Input Current	V <sub>cc</sub> = 6V, V <sub>in</sub> = V <sub>cc</sub> (Pins 7, 15)				0.5	uA	1
						5	uA	2, 3
		V <sub>cc</sub> = 6V, V <sub>in</sub> = Gnd (Pins 7, 15)				-0.5	uA	1
						-5	uA	2, 3
		V <sub>cc</sub> = 6V, V <sub>in</sub> = V <sub>cc</sub> (all other pins)				0.1	uA	1
						1	uA	2, 3
V <sub>cc</sub> = 6V, V <sub>in</sub> = Gnd (all other pins)				-0.1	uA	1		
				-1	uA	2, 3		
I <sub>cc</sub>	Maximum Quiescent Supply Current (Standby)	V <sub>cc</sub> = 6V, V <sub>in</sub> = V <sub>cc</sub> or Gnd, I <sub>out</sub> = 0uA				8	uA	1
						160	uA	2, 3
I <sub>cc</sub>	Maximum Active Supply Current (Per Monostable)	V <sub>cc</sub> = 2V, V <sub>in</sub> = V <sub>cc</sub> or Gnd, R/Cext = 0.5V <sub>cc</sub>				80	uA	1
						130	uA	2, 3
		V <sub>cc</sub> = 4.5V, V <sub>in</sub> = V <sub>cc</sub> or Gnd, R/Cext = 0.5V <sub>cc</sub>				1	mA	1
						1.6	mA	2, 3
		V <sub>cc</sub> = 6V, V <sub>in</sub> = V <sub>cc</sub> or Gnd, R/Cext = 0.5V <sub>cc</sub>				2	mA	1
						3.2	mA	2, 3

## Electrical Characteristics

### AC PARAMETERS: PROPAGATION DELAY TIME:

(The following conditions apply to all the following parameters, unless otherwise specified.)  
AC:  $t_r = t_f = 6\text{nS}$ ,  $C_l = 50\text{pF}$  or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tPLH	Trigger Delay (A, B or Clear to Q)	Vcc = 2V				169	nS	9
						210	nS	10, 11
		Vcc = 4.5V				42	nS	9
						57	nS	10, 11
		Vcc = 6V				32	nS	9
						44	nS	10, 11
tPHL	Trigger Delay (A, B or Clear to Q)	Vcc = 2V				197	nS	9
tPHL	Trigger Delay (A, B or Clear to Q)	Vcc = 2V				250	nS	10, 11
tPHL	Trigger Delay (A, B or Clear to Q)	Vccc = 4.5V				48	nS	9
tPHL	Trigger Delay (A, B or Clear to Q)	Vccc = 4.5V				67	nS	10, 11
tPHL	Trigger Delay (A, B or Clear to Q)	Vcc = 6V				38	nS	9
tPHL	Trigger Delay (A, B or Clear to Q)	Vcc = 6V				51	nS	10, 11
tPLH	Clear to Q	Vcc = 2V				116	nS	9
tPLH	Clear to Q	Vcc = 2V				147	nS	10, 11
tPLH	Clear to Q	Vcc = 4.5V				36	nS	9
tPLH	Clear to Q	Vcc = 4.5V				46	nS	10, 11
tPLH	Clear to Q	Vcc = 6V				29	nS	9
tPLH	Clear to Q	Vcc = 6V				37	nS	10, 11
tPHL	Clear to Q	Vcc = 2V				114	nS	9
						143	nS	10, 11
		Vcc = 4.5V				34	nS	9
						45	nS	10, 11
		Vcc = 6V				28	nS	9
						36	nS	10, 11

## Electrical Characteristics

### AC PARAMETERS:

(The following conditions apply to all the following parameters, unless otherwise specified.)  
AC:  $t_r = t_f = 6\text{nS}$ ,  $C_l = 50\text{pF}$  or equivalent impedance provided by diode load.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tREM	Minimum Clear Removal Time	Vcc = 2V	1			0	nS	9, 10, 11
		Vcc = 4.5V	1			0	nS	9, 10, 11
		Vcc = 6V	1			0	nS	9, 10, 11
tWQ	Output Pulse Width	Vcc = 4.5V, Cext = 0.1 $\mu$ F, Rext = 10K Ohms	1		0.9	1.2	mS	9
			1		0.70	1.15	mS	10, 11
tW	Minimum Pulse Width (A, B, Clear)	Vcc = 2V	1			123	nS	9
			1			157	nS	10, 11
		Vcc = 4.5V	1			30	nS	9
			1			42	nS	10, 11
		Vcc = 6V	1			21	nS	9
			1			30	nS	10, 11
tWQ(min)	Minimum Output Pulse Width	Vcc = 2V, Rext = 6K Ohms, Cext = 28pF	2		0.85		$\mu$ S	9
		Vcc = 4.5V, Rext = 2K Ohms, Cext = 28pF	2		220		nS	9
		Vcc = 6V, Rext = 2K Ohms, Cext = 28pF	2		170		nS	9
tTHL/tTLH	Maximum Output Rise & Fall Time	Vcc = 2V	2			75	nS	9
			2			110	nS	10, 11
		Vcc = 4.5V	2			15	nS	9
			2			22	nS	10, 11
		Vcc = 6V	2			13	nS	9
			2			19	nS	10, 11
tr,tf	Maximum Input Rise & Fall Time	Vcc = 2V	2		1000		nS	9, 10, 11
		Vcc = 4.5V	2		500		nS	9, 10, 11
		Vcc = 6V	2		400		nS	9, 10, 11
Cin	Maximum Input Capacitance	(Pins 7 & 15)	2			20	pF	9, 10, 11
		(Other inputs)	2			10	pF	9, 10, 11

Note 1: Parameter tested go-no-go only.

Note 2: Guaranteed parameter, not tested.