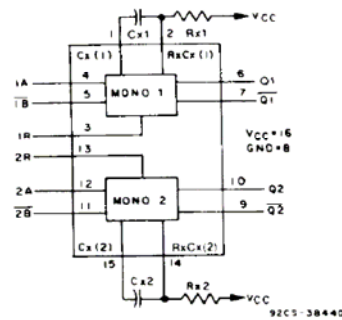


Dual Precision Monostable Multivibrator

CD54HC4538/3A
CD54HCT4538/3A

The RCA CD54HC4538 and CD54HCT4538 are dual retriggerable/resettable monostable precision multivibrators for fixed-voltage timing applications. An external resistor (R_x) and an external capacitor (C_x) control the timing and the accuracy for the circuit. Adjustment of R_x and C_x provides a wide range of output pulse widths from the Q and \bar{Q} terminals. The propagation delay from trigger input-to-output transition and the propagation delay from reset input-to-output transition are independent of R_x and C_x .

Leading-edge triggering (A) and trailing-edge triggering (\bar{B}) inputs are provided for triggering from either edge of the input pulse. An unused "A" input should be tied to Gnd and an unused \bar{B} should be tied to V_{CC} . On power up, the IC is reset. Unused resets and sections must be terminated. In normal operation, the circuit retriggers on the application of each new trigger pulse. To operate in the non-retriggerable mode Q is connected to \bar{B} when leading-edge triggering (A) is used or Q is connected to A when trailing-edge triggering (\bar{B}) is used. The period (τ) can be calculated from $\tau = (0.7) R_x C_x$; R_{min} is 5k ohms. C_{min} is 0 pF.



FUNCTIONAL DIAGRAM

Package Specifications

See Section 11, Fig. 11

CD54HC4538/3A
CD54HCT4538/3A

Static Electrical Characteristics (Limits with black dots (•) are tested 100%) — Complete Specification

CHARACTERISTIC	CD54HC4538								CD54HCT4538								UNITS
	TEST CONDITIONS			LIMITS					TEST CONDITIONS			LIMITS					
	V _I V	I _O mA	V _{CC} V	+25° C			-55/ +125° C		V _I V	V _{CC} V	+25° C			-55/ +125° C			
				Min.	Typ.	Max.	Min.	Max.			Min.	Typ.	Max.	Min.	Max.		
High-Level Input Voltage V _{IH}			2	1.5	—	—	1.5	—	—	4.5						V	
			4.5	3.15•	—	—	3.15•	—	—	to	2•	—	—	2•	—		
			6	4.2	—	—	4.2	—	—	5.5							
Low-Level Input Voltage V _{IL}			2	—	—	0.5	—	0.5	—	4.5						V	
			4.5	—	—	1.35•	—	1.35•	—	to	—	—	0.8•	—	0.8•		
			6	—	—	1.8	—	1.8	—	5.5							
High-Level Output Voltage V _{OH}	V _{IL} or V _{IH}	-0.02	2	1.9	—	—	1.9	—	V _{IL} or V _{IH}	4.5	4.4•	—	—	4.4•	—	V	
			4.5	4.4•	—	—	4.4•	—	4.5	4.4•	—	—	4.4•	—			
	CMOS Loads TTL Loads	V _{IL} or V _{IH}	-4 -5.2	4.5	3.98•	—	—	3.7•	—	V _{IL} or V _{IH}	4.5	3.98•	—	—	3.7•	—	
				6	5.9	—	—	5.9	—	6	5.9	—	—	5.9	—		
Low-Level Output Voltage V _{OL}	V _{IL} or V _{IH}	0.02	2	—	—	0.1	—	0.1	V _{IL} or V _{IH}	4.5	—	—	0.1•	—	0.1•	V	
			4.5	—	—	0.1•	—	0.1•	—	—	—	—	0.1•	—			
	CMOS Loads TTL Loads	V _{IL} or V _{IH}	4 5.2	4.5	—	—	0.26•	—	0.4•	V _{IL} or V _{IH}	4.5	—	—	0.26•	—	0.4•	
				6	—	—	0.26	—	0.4	—	—	—	—	0.26	—	0.4	
Input Leakage Current A, B, R I _I	V _{CC}		6	—	—	±0.1•	—	±1•	Any Voltage Between V _{CC} & Gnd	5.5	—	—	±0.1•	—	±1•	μA	
	or I _I Gnd		6	—	—	±0.05	—	±0.5		5.5	—	—	±0.05	—	±0.5		
Quiescent Device Current I _{CC}	V _{CC} or Gnd	0	6	—	—	8•	—	160•	V _{CC} or Gnd	5.5	—	—	8•	—	160•	μA	
Active Device Current Q = High & Pins 2 & 14 @ V _{CC} /4 I _{CC}	V _{CC} or Gnd	0	6	—	—	0.6•	—	1•	V _{CC} or Gnd	5.5	—	—	0.6	—	1•	μA	
Additional Quiescent Device Current per Input Pin: 1 Unit Load ΔI _{CC} *									V _{CC} -2.1 to 5.5	4.5 to 5.5	—	100	360	—	490	μA	

*For dual-supply systems theoretical worst case (V_I = 2.4 V, V_{CC} = 5.5 V) specification is 1.8 mA.
†When testing I_{IL} the Q output must be high. If Q is low (device not triggered) the pull-up P device will be ON and the low resistance path from V_{CC} to the test pin will cause a current far exceeding the specification.

HCT INPUT LOADING TABLE

INPUT	UNIT LOAD*
All	0.5

*Unit load is ΔI_{CC} limit specified in Static Characteristics Chart, e.g., 360 μA max. @ 25° C.

Switching Speed (Limits with black dots (•) are tested 100%.)

SWITCHING CHARACTERISTICS ($C_L = 50 \text{ pF}$, Input $t_r, t_f = 6 \text{ ns}$)

CHARACTERISTIC	SYMBOL	V_{CC} V	25° C				-55° C to +125° C				UNITS
			HC		HCT		54HC		54HCT		
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Propagation Delay A, B to Q	t_{PLH}	2	—	250	—	—	—	375	—	—	ns
		4.5	—	50•	—	55•	—	75•	—	83•	
		6	—	43	—	—	—	64	—	—	
A, \bar{B} to \bar{Q}	t_{PHL}	2	—	250	—	—	—	375	—	—	
		4.5	—	50•	—	55•	—	75•	—	83•	
		6	—	43	—	—	—	64	—	—	
\bar{R} to Q	t_{PHL}	2	—	250	—	—	—	375	—	—	
		4.5	—	50•	—	40•	—	75•	—	60•	
		6	—	43	—	—	—	64	—	—	
\bar{R} to \bar{Q}	t_{PLH}	2	—	250	—	—	—	375	—	—	
		4.5	—	50•	—	50•	—	75•	—	75•	
		6	—	43	—	—	—	64	—	—	
Output Transition Time	t_{TLH} t_{THL}	2	—	75	—	—	—	110	—	—	
		4.5	—	15	—	15	—	22	—	22	
		6	—	13	—	—	—	19	—	—	
Output Pulse Width $R_x = 10 \Omega, C_x = 0.1 \mu\text{F}$	τ	3	0.64	0.78	—	—	0.605	0.819	—	—	ms
		5	0.63•	0.77•	0.63•	0.77•	0.595•	0.805•	0.595•	0.805•	
Output Pulse Width Match, Same Pkg.			Type $\pm 1\%$								
Input Capacitance	C_i	—	—	10	—	10	—	10	—	10	pF

Burn-In Test-Circuit Connections (Use Static II for /3A burn-in and Dynamic for Life Test.)

Static	STATIC BURN-IN I			STATIC BURN-IN II		
	OPEN	GROUND	V_{CC} (6V)	OPEN	GROUND	V_{CC} (6V)
CD54HC/HCT4538	1,2,6,7,9, 10,14,15	3-5,8,11-13	16	1,2,6,7,9, 10,14,15	8	3-5,11-13,16
Dynamic	OPEN	GROUND	$1/2 V_{CC}$ (3V)	V_{CC} (6V)	OSCILLATOR	
CD54HC/HCT4538	—	1,4,8,12,15	6,7,9,10	2,14,16	50 kHz	25 kHz
					5,11	3,13

NOTE: Each pin except V_{CC} and Gnd will have a resistor of 2k-47k ohms.