

# Dual retriggerable monostable multivibrator with reset

## 74HC/HCT423

### FEATURES

- DC triggered from active HIGH or active LOW inputs
- Retriggerable for very long pulses up to 100% duty factor
- Direct reset terminates output pulse
- Schmitt-trigger action on all inputs except for the reset input
- Output capability: standard (except for nR<sub>EXT</sub>/C<sub>EXT</sub>)
- I<sub>CC</sub> category: MSI

### GENERAL DESCRIPTION

The 74HC/HCT423 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT423 are dual retriggerable monostable multivibrators with output pulse width control by two methods. The basic pulse time is programmed by selection of an external resistor (R<sub>EXT</sub>) and capacitor

(C<sub>EXT</sub>). The external resistor and capacitor are normally connected as shown in Fig.6.

Once triggered, the basic output pulse width may be extended by retriggering the gated active LOW-going edge input (n $\bar{A}$ ) or the active HIGH-going edge input (nB). By repeating this process, the output pulse period (nQ = HIGH, n $\bar{Q}$  = LOW) can be made as long as desired. When n $\bar{R}_D$  is LOW, it forces the nQ output LOW, the n $\bar{Q}$  output HIGH and also inhibits the triggering.

Figures 7 and 8 illustrate pulse control by reset. The basic output pulse width is essentially determined by the values of the external timing components R<sub>EXT</sub> and C<sub>EXT</sub>.

For pulse widths, when C<sub>EXT</sub> < 10 000 pF, see Fig.9.

When C<sub>EXT</sub> > 10 000 pF, the typical output pulse width is defined as:

$$t_W = 0.45 \times R_{EXT} \times C_{EXT} \text{ (typ.)},$$

where, t<sub>W</sub> = pulse width in ns;

R<sub>EXT</sub> = external resistor in k $\Omega$ ;

C<sub>EXT</sub> = external capacitor in pF.

Schmitt-trigger action in the n $\bar{A}$  and nB inputs, makes the circuit highly tolerant to slower input rise and fall times.

The "423" is identical to the "123" but cannot be triggered via the reset input.

### QUICK REFERENCE DATA

GND = 0 V; T<sub>amb</sub> = 25 °C; t<sub>r</sub> = t<sub>f</sub> = 6 ns

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
t <sub>PHL</sub> / t <sub>PLH</sub>	propagation delay n $\bar{A}$ , nB to nQ, n $\bar{Q}$ n $\bar{R}_D$ to nQ, n $\bar{Q}$	C <sub>L</sub> = 15 pF; V <sub>CC</sub> = 5 V; R <sub>EXT</sub> = 5 k $\Omega$ ; C <sub>EXT</sub> = 0 pF	25	26	ns
			20	22	ns
C <sub>I</sub>	input capacitance		3.5	3.5	pF
t <sub>W</sub>	minimum output pulse width nQ, n $\bar{Q}$	notes 1 and 2	75	75	ns

### Notes

1. C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in  $\mu$ W):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o) + 0.75 \times C_{EXT} \times V_{CC}^2 \times f_o + D \times 16 \times V_{CC} \text{ where:}$$

f<sub>i</sub> = input frequency in MHz

f<sub>o</sub> = output frequency in MHz

D = duty factor in %

$\sum (C_L \times V_{CC}^2 \times f_o)$  = sum of outputs

C<sub>L</sub> = output load capacitance in pF

V<sub>CC</sub> = supply voltage in V

C<sub>EXT</sub> = timing capacitance in pF

2. For HC the condition is V<sub>I</sub> = GND to V<sub>CC</sub>  
For HCT the condition is V<sub>I</sub> = GND to V<sub>CC</sub> - 1.5 V

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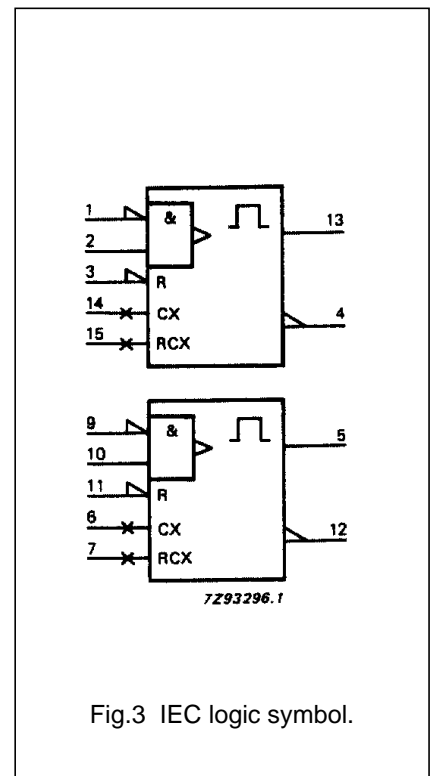
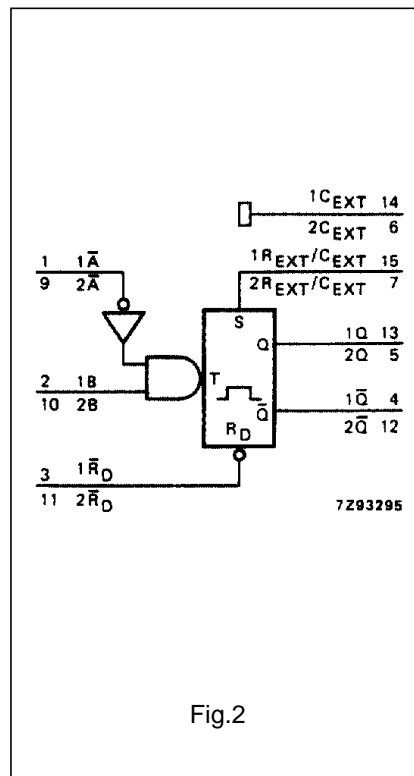
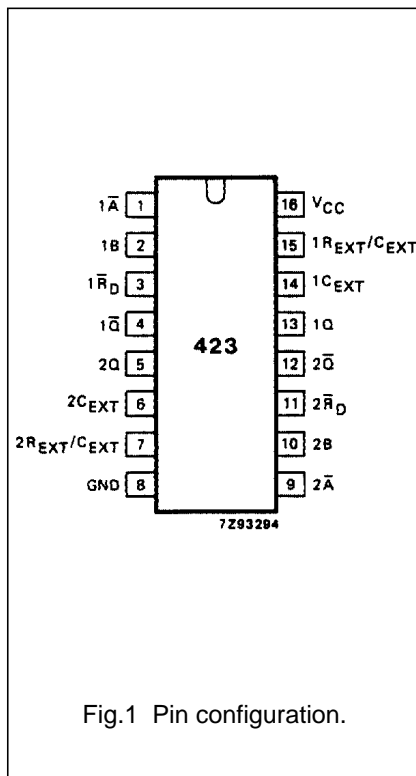
74HC/HCT423

## ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
74HC423N; 74HCT423N	DIP16	plastic dual in-line package; 16 leads (300 mil); long body	SOT38-1
74HC423D; 74HCT423D	SO16	plastic small outline package; 16 leads; body width 3.9 mm; low stand-off height	SOT109-1

## PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1, 9	$1\bar{A}, 2\bar{A}$	trigger inputs (negative-edge triggered)
2, 10	1B, 2B	trigger inputs (positive-edge triggered)
3, 11	$1\bar{R}_D, 2\bar{R}_D$	direct reset action (active LOW)
4, 12	$1\bar{Q}, 2\bar{Q}$	outputs (active LOW)
7	$2R_{EXT}/C_{EXT}$	external resistor/capacitor connection
8	GND	ground (0 V)
13, 5	1Q, 2Q	outputs (active HIGH)
14, 6	$1C_{EXT}, 2C_{EXT}$	external capacitor connection
15	$1R_{EXT}/C_{EXT}$	external resistor/capacitor connection
16	$V_{CC}$	positive supply voltage



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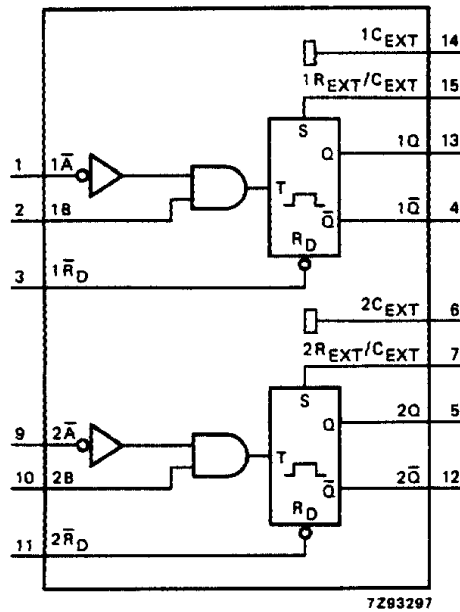


Fig.4 Functional diagram.

FUNCTION TABLE

INPUTS			OUTPUTS	
$n\bar{R}_D$	$n\bar{A}$	$nB$	$nQ$	$n\bar{Q}$
L	X	X	L	H
X	H	X	L <sup>(2)</sup>	H <sup>(2)</sup>
X	X	L	L <sup>(2)</sup>	H <sup>(2)</sup>
H	L	↑		
H	↓	H		

Notes

- H = HIGH voltage level
  - L = LOW voltage level
  - X = don't care
  - ↑ = LOW-to-HIGH transition
  - ↓ = HIGH-to-LOW transition
  - = one HIGH level output pulse
  - = one LOW level output pulse
- If the monostable was triggered before this condition was established, the pulse will continue as programmed.