

HD74LS122 ● Retriggerable Monostable Multivibrators (with Clear)

This d-c triggered multivibrator features output pulse width control by three methods. The basic pulse time is programmed by selection of external resistance and capacitance values. The HD74LS122 has an internal timing resistor that allows the circuit to be used with only an external capacitor, if so desired. Once triggered, the basic pulse width may be extended by retriggering the gated low-level-active (A) or high-level-active (B) inputs or be reduced by use of the overriding clear. Fig. 1 illustrates pulse control by retriggering and early clear. This device is provided with enough Schmitt hysteresis to ensure jitter-free triggering from the B input with transition rates as slow as 0.1 mV/ns.

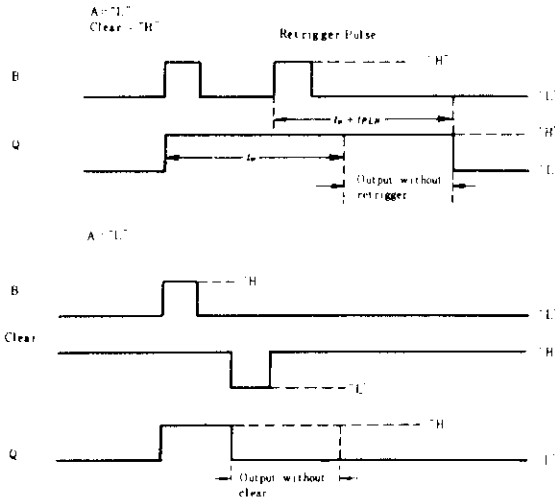
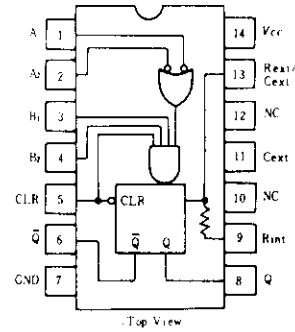


Fig.1 Typical Input/Output Pulses

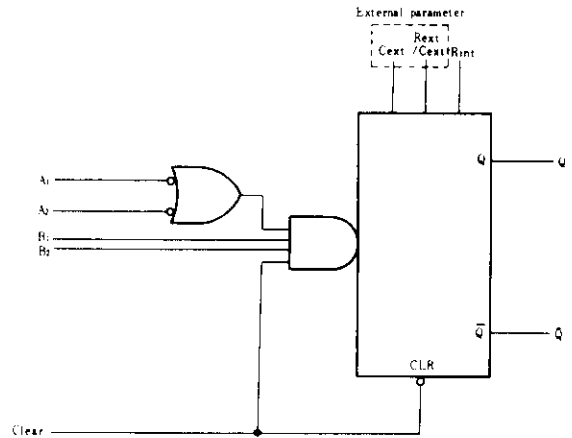
RECOMMENDED OPERATING CONDITIONS

Item	Symbol	min	typ	max	Unit
Input pulse width	t_w	40	—	—	ns
External timing resistance	R_{ext}	5	—	260	k Ω
External capacitance	C_{ext}	Non restriction			
Wiring capacitance at R_{ext}/C_{ext} terminal	R_{ext}/C_{ext}	—	—	50	pF

PIN ARRANGEMENT



BLOCK DIAGRAM



FUNCTION TABLE

Clear	Inputs					Outputs	
	A ₁	A ₂	B ₁	B ₂	Q	Q̄	
L	X	X	X	X	L	H	
X	H	H	X	X	L	H	
X	X	X	L	X	L	H	
X	X	X	X	L	L	H	
H	L	X	↑	H	⌋	⌋	
H	L	X	H	↑	⌋	⌋	
H	X	L	↑	H	⌋	⌋	
H	X	L	H	↑	⌋	⌋	
H	H	↓	H	H	⌋	⌋	
H	↓	↓	H	H	⌋	⌋	
H	↓	H	H	H	⌋	⌋	
↑	L	X	H	H	⌋	⌋	
↑	X	L	H	H	⌋	⌋	

H: high level, L: low level, X: irrelevant.
 ↑: transition from low to high level.
 ↓: transition from high to low level.
 ⌋: one high-level pulse.
 ⌋: one low-level pulse.

■ ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^\circ\text{C}$)

Item	Symbol	Test Conditions	min	typ*	max	Unit
Input voltage	V_{IH}		2.0	—	—	V
	V_{IL}		—	—	0.8	V
Output voltage	V_{OH}	$V_{CC}=4.75\text{V}, V_{IH}=2\text{V}, V_{IL}=0.8\text{V}, I_{OH}=-400\mu\text{A}$	2.7	—	—	V
	V_{OL}	$V_{CC}=4.75\text{V}, V_{IH}=2\text{V}$	—	—	0.4	V
		$V_{IL}=0.8\text{V}$	$I_{OL}=4\text{mA}$	—	—	
Input current	I_{IH}	$V_{CC}=5.25\text{V}, V_I=2.7\text{V}$	—	—	20	μA
	I_{IL}	$V_{CC}=5.25\text{V}, V_I=0.4\text{V}$	—	—	-0.4	mA
	I_I	$V_{CC}=5.25\text{V}, V_I=7\text{V}$	—	—	0.1	mA
Short-circuit output current	I_{OS}	$V_{CC}=5.25\text{V}$	-20	—	-100	mA
Supply current **	I_{CC}	$V_{CC}=5.25\text{V}$	—	6	11	mA
Input clamp voltage	V_{IK}	$V_{CC}=4.75\text{V}, I_{IN}=-18\text{mA}$	—	—	-1.5	V

* $V_{CC} = 5\text{V}, T_a = 25^\circ\text{C}$

** With all outputs open and 4.5V applied to all data and clear inputs, I_{CC} is measured after a momentary ground, then 4.5V, is applied to clock.

Note) To measure V_{OH} at Q, V_{OL} at \bar{Q} , or I_{OS} at Q, ground R_{ext}/C_{ext} , apply 2V to B and clear, and pulse A from 2V to 0V.

■ SWITCHING CHARACTERISTICS ($V_{CC}=5\text{V}, T_a=25^\circ\text{C}$)

Item	Symbol	Inputs	Outputs	Test Conditions	min	typ	max	Unit
Propagation delay time	t_{PLH}	A	Q	$C_{ext}=0$ $R_{ext}=5\text{k}\Omega$ $C_L=15\text{pF}$ $R_L=2\text{k}\Omega$	—	23	33	ns
	t_{PHL}		\bar{Q}		—	32	45	
	t_{PLH}	B	Q		—	23	44	
	t_{PHL}		\bar{Q}		—	34	56	
	t_{PLH}	Clear	Q		—	20	27	
	t_{PHL}		\bar{Q}		—	28	45	
Output pulse width	$t_{out(max)}$	A or B	Q	$C_{ext}=1000\text{pF}, R_{ext}=10\text{k}\Omega$ $C_L=15\text{pF}, R_L=2\text{k}\Omega$	—	116	200	μs
	t_{out}	A or B	Q		4	4.5	5	

■ TYPICAL APPLICATION DATA FOR HD74LS122

For pulse widths when $C_{ext} \leq 1000\text{pF}$, See Fig. 3.

The output pulse is primarily a function of the external capacitor and resistor. For $C_{ext} > 1000\text{pF}$, the output pulse width (t_w) is defined as: $t_w(\text{out}) = K \cdot R_{ext} \cdot C_{ext}$; See Fig. 4

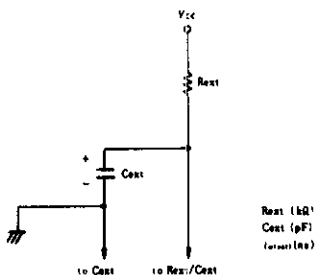


Fig.2 Timing Component Connections

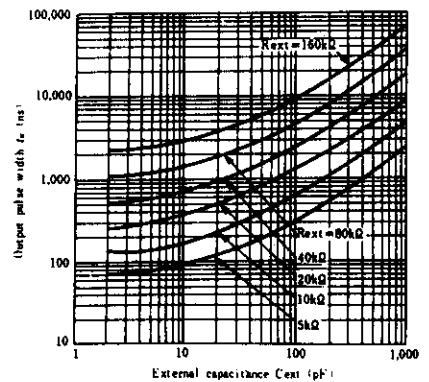
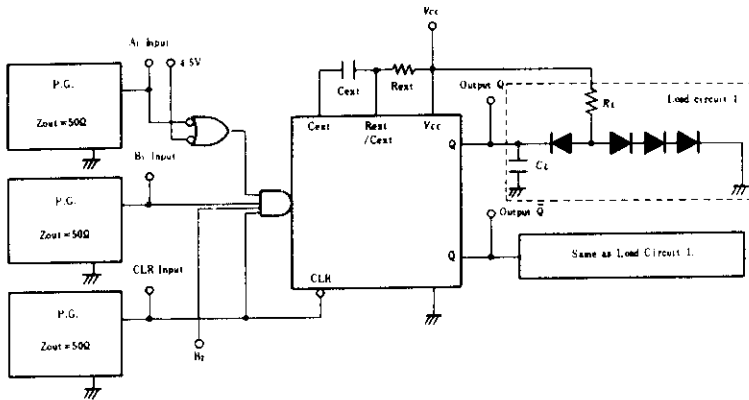


Fig.3 Typical Output Pulse Width ($C_{ext} \leq 1000\text{pF}$)

TESTING METHOD

1) Test Circuit



- Notes)
1. C_L includes probe and jig capacitance.
 2. All diodes are 1S2074 \oplus .
 3. Input pulse; $t_{TLH} \leq 15\text{ns}$, $t_{THL} \leq 6\text{ns}$.

Waveform

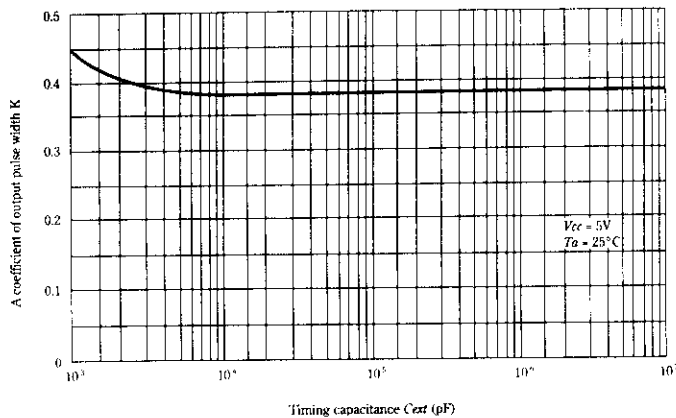
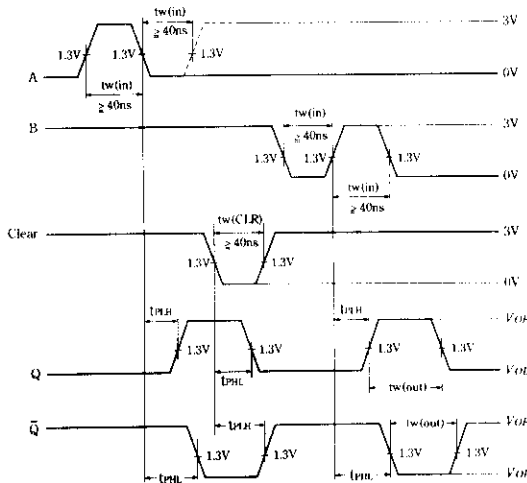
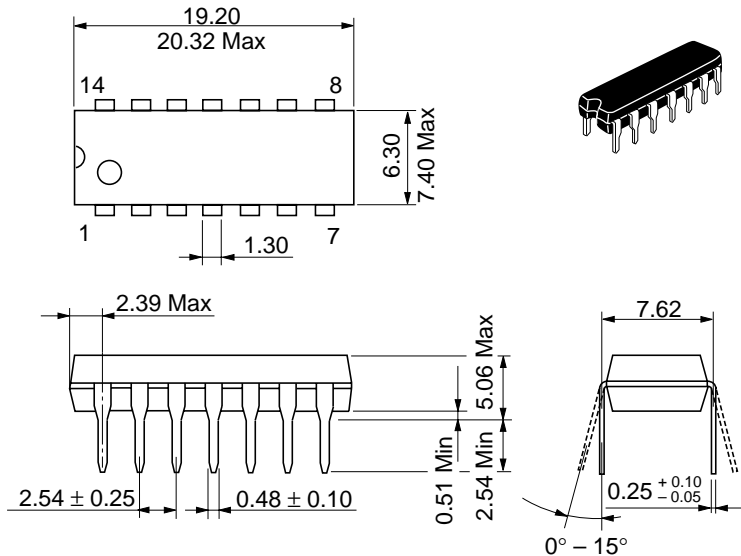
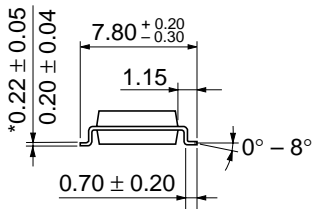


Fig.4 Cest vs K (Cest > 1000pF)



Hitachi Code	DP-14
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.97 g



Hitachi Code	FP-14DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.23 g

*Dimension including the plating thickness
Base material dimension



Hitachi Code	FP-14DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.13 g

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