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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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HD74LS123 ● Dual Retriggerable Monostable Multivibrators (with Clear)

This d-c triggered multivibrator features output pulse width control by three method. The basic pulse time is programmed by selection of external resistance and capacitance values. Once triggered, the basic pulse width may be extended by re-triggering 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 enough Schmitt hysteresis to ensure jitter-free triggering from the B input with transition rates as slow as 0.1 mV/ns.

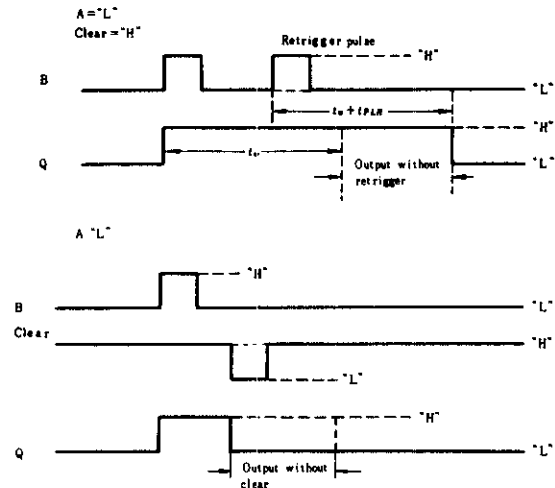
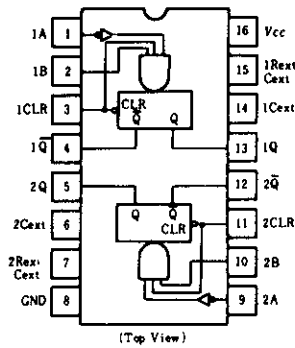


Fig.1 Typical Input/Output Pulses

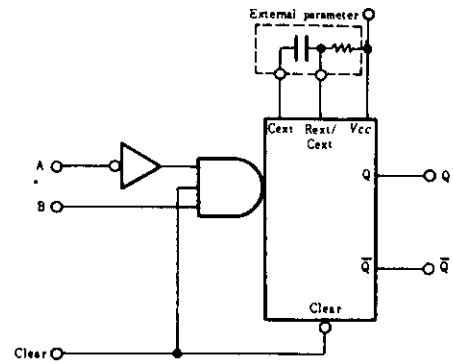
RECOMMENDED OPERATING CONDITIONS

Item	Symbol	min	typ	max	Unit
Input pulse width	A, B "H"	40	—	—	ns
	CLR "L"	40	—	—	ns
	CLR "L"	40	—	—	ns
External timing resistance	R_{ext}	5	—	260	k Ω
External capacitance	C_{ext}	Non restriction			
Wiring capacitance at Rext/Cext terminal		—	—	50	pF

PIN ARRANGEMENT



BLOCK DIAGRAM (1/2)



FUNCTION TABLE

Inputs			Outputs	
CLEAR	A	B	Q	$\bar{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↑	one high-level pulse	one low-level pulse
H	↓	H	one high-level pulse	one low-level pulse
↑	L	H	one high-level pulse	one low-level pulse

Notes) H; high level, L; low level, X; irrelevant
↓; transition from high to low level
↑; transition from low to high 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}	$V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$, $I_{OL}=4\text{mA}$	—	—	0.4	V
		$I_{OL}=8\text{mA}$	—	—	0.5	
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}	$V_{CC}=5.25\text{V}$	—	12	20	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 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	$C_{ext}=0\text{pF}$ $R_{ext}=5\text{k}\Omega$ $C_L=15\text{pF}$ $R_L=2\text{k}\Omega$	—	23	33	ns
	t_{PHL}		$\bar{Q}$		—	32	45	
	t_{PLH}	B	Q		—	23	44	
	t_{PHL}		$\bar{Q}$		—	34	56	
	t_{PHL}	CLR	Q		—	20	27	
	t_{PLH}		$\bar{Q}$		—	28	45	
Output pulse width	$t_{out(min)}$	A, B	Q	$C_{ext}=1,000\text{pF}$, $R_{ext}=10\text{k}\Omega$ $C_L=15\text{pF}$, $R_L=2\text{k}\Omega$	—	116	200	μs
	$t_{out(max)}$				4	4.5	5	

TYPICAL APPLICATION DATA FOR HD74LS123

For pulse widths when $C_{ext} < 1000\text{pF}$, 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: $t_w(out) = K \cdot R_{ext} \cdot C_{ext}$; See Fig. 4

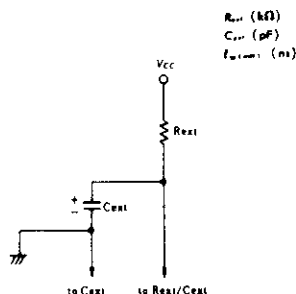


Fig.2 Timing Component Connections

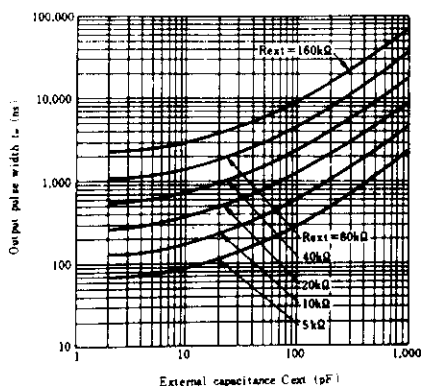


Fig.3 Typical Output Pulse Width ($C_{ext} \leq 1000\text{pF}$)

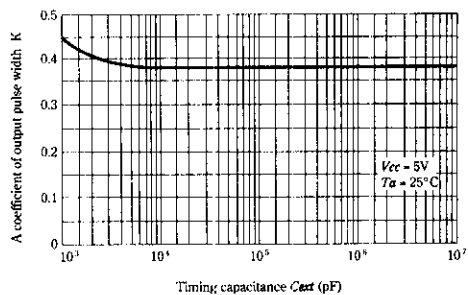
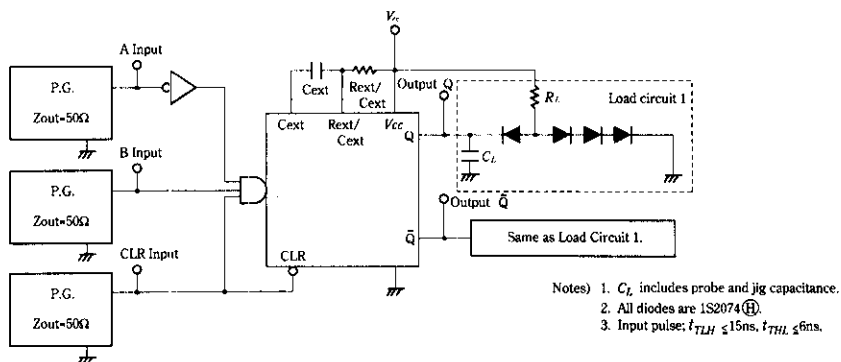


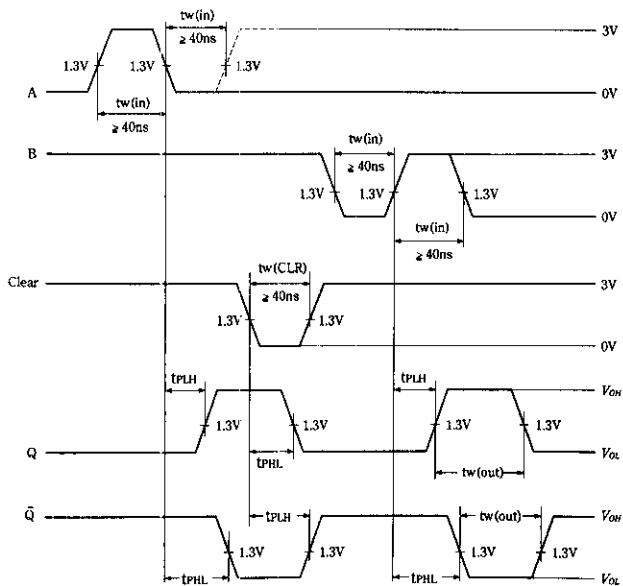
Fig.4 C_{ext} vs K ($C_{ext} > 1000pF$)

■ TESTING METHOD

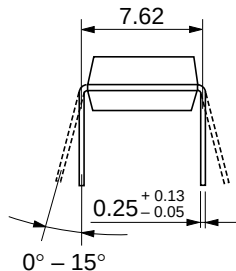
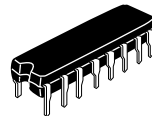
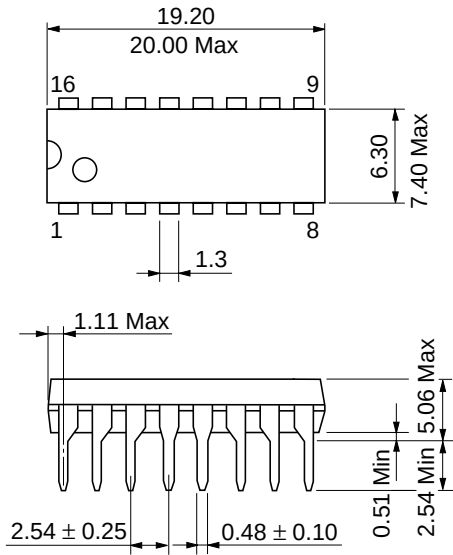
1) Test Circuit



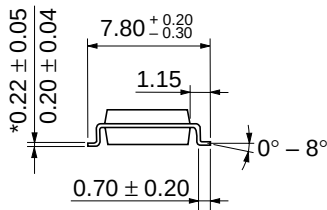
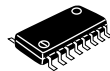
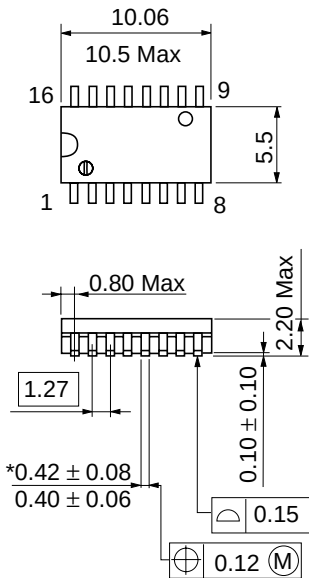
Waveform



Unit: mm

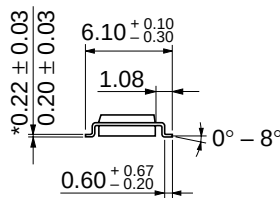
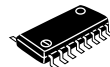
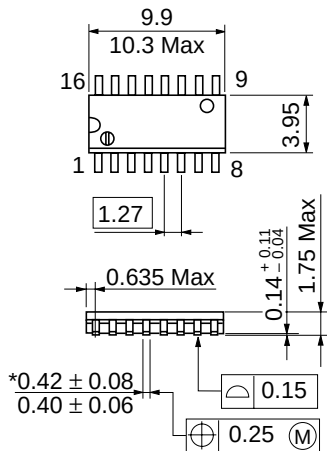


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.24 g



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
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