

DN74LS123 *N74LS123*

Dual Retriggerable Monostable Multivibrators (with Reset)

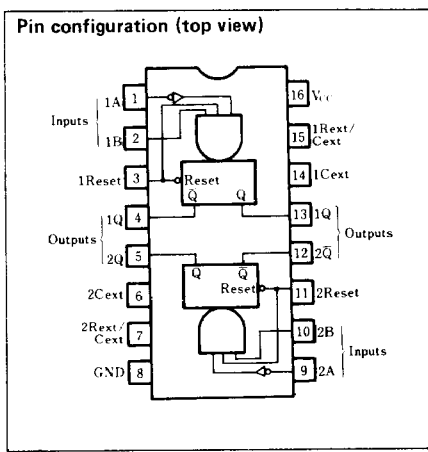
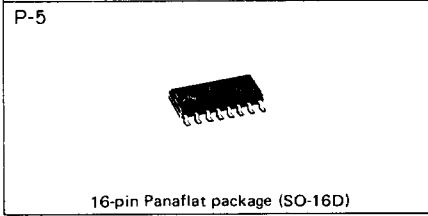
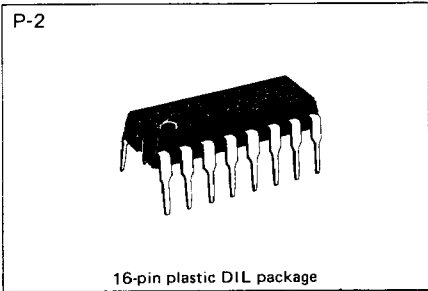
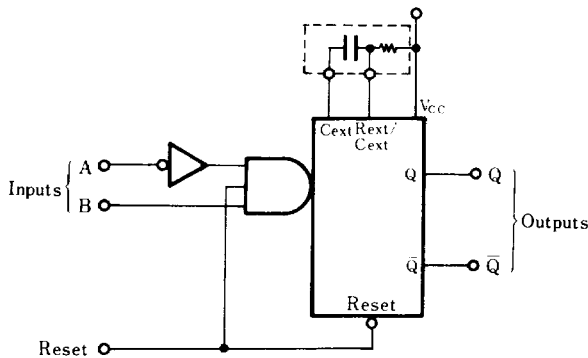
■ Description

DN74LS123 contains two retriggerable monostable multi-vibrator circuits with direct-coupled reset input terminals.

■ Features

- Retriggerable for long output pulse width generation capability
- Direct-coupled reset input for output pulse interruption capability
- Complementary A and B inputs
- Q and \bar{Q} outputs
- Wide operating temperature range ($T_a = -20$ to $+75^\circ\text{C}$)

■ Logic diagram (1/2)



■ Recommended operating conditions

Parameter	Sym	Min	Typ	Max	Unit
Supply voltage	V_{CC}	4.75	5.00	5.25	V
Output current	I_{OH}			-400	μA
	I_{OL}			8	mA
Operating temperature range	T_{opr}	-20	25	75	$^\circ\text{C}$
Input pulse width	A, B	"H"	40		ns
		"L"	40		ns
	Reset	"L"	40		ns
External timing resistance	R_{ext}	5		260	$k\Omega$
External capacitance	C_{ext}		Unlimited		
Wiring capacitance (R_{ext}/C_{ext} terminals)				50	pF

■ DC characteristics (Ta = -20 ~ +75°C)

Parameter	Sym	Test conditions	Min	Typ*	Max	Unit
Input voltage	V _{IH}		2.0			V
	V _{IL}				0.8	V
Output voltage	V _{OH}	V _{CC} =4.75V, V _{IH} =2V V _{IL} =0.8V, I _{OH} =-400μA	2.7	3.4		V
	V _{OL1}	V _{CC} =4.75V V _{IH} =2V, I _{OL} =4mA		0.25	0.4	V
	V _{OL2}	V _{CC} =4.75V V _{IH} =2V, I _{OL} =8mA		0.35	0.5	V
Input current	I _{IH}	V _{CC} =5.25V V _I =2.7V			20	μA
	I _{IL}	V _{CC} =5.25V V _I =0.4V			-0.4	mA
	I _I	V _{CC} =5.25V V _I =7V			0.1	mA
Output short circuit current**	I _{OS}	V _{CC} =5.25V, V _O =0V	-15		-100	mA
Input clamp voltage	V _{IK}	V _{CC} =5.25V, I _I =-18mA			-1.5	V
Supply current***	I _{CC}	I _{CC} =5.25V		12	20	mA

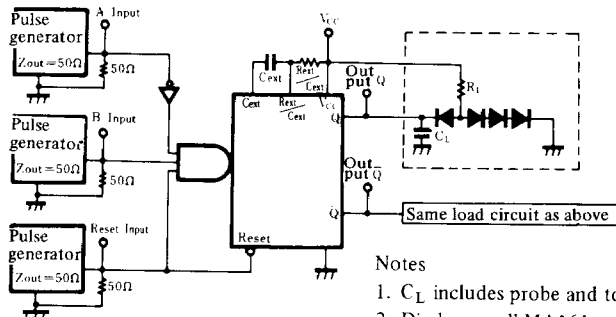
- * When constant at V_{CC} = 5V, Ta = 25°C.
- ** V_{OH} of Q, V_{OL} of \bar{Q} , and I_{OS} of Q are measured with R_{ext}/C_{ext} grounded, 2V applied to B and reset inputs, and a pulse from 2V to 0V then applied to A.
- *** Only one output at a time short circuited to GND. Also, short circuit time to GND within 1 second.
- **** I_{CC} is measured with all outputs open and 4.5V applied to reset and B inputs; also, A input is grounded momentarily, following which 4.5V is applied to it.

■ Switching characteristics (V_{CC}=5V, Ta = 25°C)

Parameter	Sym	Inputs	Outputs	Test conditions	Min	Typ	Max	Unit
Propagation delay time	t _{PLH}	A	Q	C _{ext} = 0pF R _{ext} = 5KΩ C _L = 15pF R _L = 2kΩ		23	33	ns
	t _{PHL}		\bar{Q}			23	45	
	t _{PLH}	B	Q			32	44	
	t _{PHL}		\bar{Q}			34	56	
	t _{PLH}	Reset	Q			20	27	
	t _{PHL}		\bar{Q}			28	45	
Minimum output pulse width	t _{w(out)min}	A, B	Q	C _{ext} =1000pF, R _L =2kΩ R _{ext} =10kΩ, C _L =15pF		116	200	μs
Output pulse width	t _{w(out)}					4	4.5	

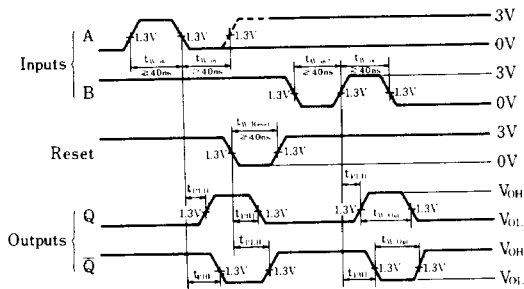
※ Switching parameter measurement information

1. Measurement circuit



- Notes
1. C_L includes probe and tool floating capacitance.
 2. Diodes are all MA161.

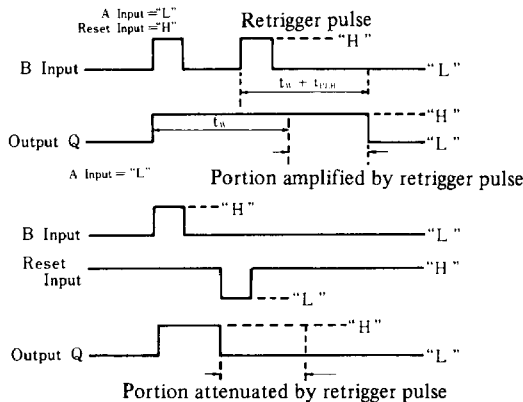
2. Waveforms (A, B, Reset → Q, \bar{Q})



Notes

1. Input waveform: $t_r \geq 15\text{ns}$, $t_f \geq 6\text{ns}$, (10% — 90%)

Typical examples of responses to output pulses



Truth tables

Inputs			Outputs	
Reset	A	B	Q	\bar{Q}
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↑		
H	↓	H		
↑	L	H		

- Notes
1. H: HIGH voltage level.
 2. L: LOW voltage level.
 3. ↓: Change from HIGH to LOW.
 4. ↑: Change from LOW to HIGH.
 5. X: Either HIGH or LOW; doesn't matter.
 6. : One HIGH level pulse.
 7. : One LOW level pulse.
 8. External timing capacitance is connected between C_{ext} and R_{ext}/C_{ext} .

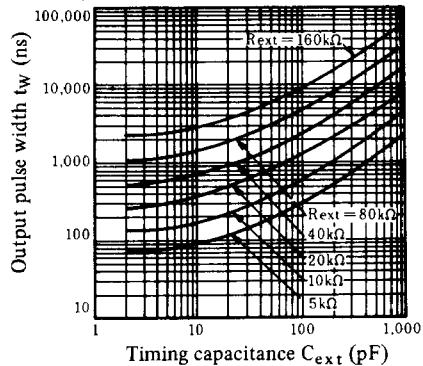
Typical function example

The basic output pulse width is determined by the externally connected capacitance and timing resistance.

Timing component connection method

- (1) When $C_{ext} \leq 1000\text{pF}$ (refer to the illustration below):

Output pulse width versus timing capacitance ($C_{ext} \leq 1000\text{pF}$)



- (2) When $C_{ext} \leq 1000\text{pF}$:

$$t_{w(ext)} = 0.45 \cdot R_{ext} \cdot C_{ext}$$

