ELECTRONICS, INC.
44 FARRAND STREET
BLOOMFIELD, NJ 07003
(973) 748–5089
http://www.nteinc.com

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NTE74LS123
Integrated Circuit
TTL– Dual Retriggerable One–Shot w/Clear & Complementary Outputs
16–Lead DIP

Description:

The NTE74LS123 is a dual retriggerable monostable multivibrator in a 16–Lead DIP type package capable of generating output pulses from a few nano–seconds to extremely long duration up to 100% duty cycle. Each device has three inputs permitting the choice of either leading edge or trailing edge triggering. Pin (A) is an active–LOW transition trigger input and Pin (B) is an active–HIGH transition trigger input. The clear (CLR) input terminates the output pulse at a predetermined time independent of the timing components. The clear input also serves as a trigger input when it is pulsed with a low level pulse transition.

Features:

- DC Triggered from Active–HIGH Transition or Active–LOW Transition Inputs
- Retriggerable to 100% Duty Cycle
- Compensated for V_{CC} and Temperature Variations
- Triggerable from CLEAR Input
- DTL, TTL Compatible
- Input Clamp Diodes

Absolute Maximum Ratings: (Note 1)

Supply Voltage 7V
Input Voltage 7V
Operating Free–Air Temperature Range . . . . . 0° to +70°C
Storage Temperature Range . . . . . –65° to +150°C

Note 1. The “Absolute Maximum Ratings” are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values in the “Electrical Characteristics” tables are not guaranteed at the absolute maximum ratings. The “Recommended Operating Conditions” table will define the conditions for actual device operation.

Recommended Operating Conditions: (V_{CC} = +5V, T_A = +25°C unless otherwise specified)

Parameter		Symbol	Min	Typ	Max	Unit
Supply Voltage		V_{CC}	4.75	5.0	5.25	V
HIGH Level Input Voltage		V_{IH}	2	–	–	V
LOW Level Input Voltage		V_{IL}	–	–	0.8	V
HIGH Level Output Current		I_{OH}	–	–	–0.4	mA
LOW Level Output Current		I_{OL}	–	–	8	mA
Pulse Width	A or B HIGH	t_W	40	–	–	ns
	A or B LOW		40	–	–	ns
	Clear LOW		40	–	–	ns
External Timing Resistor		R_{EXT}	5	–	260	kΩ
External Timing Capacitance		C_{EXT}	No Restriction			μF
Wiring Capacitance at R_{EXT}/C_{EXT} Terminal		C_{WIRE}	–	–	50	pF
Free Air Temperature		T_A	0	–	70	°C

Electrical Characteristics: (T_A = −65° to +150°C, Note 2 unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Clamp Voltage	V_I	V_{CC} = Min, I_I = −18mA	–	–	−1.5	V
HIGH Level Output Voltage	V_{OH}	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max, V_{IH} = Min	2.7	3.4	–	V
LOW Level Output Voltage	V_{OL}		–	0.35	0.5	V
		I_{OL} = 4mA, V_{CC} = Min	–	0.25	0.4	V
Input Current at Max Input Voltage	I_I	V_{CC} = Max, V_I = 7V	–	–	0.1	mA
HIGH Level Input Current	I_{IH}	V_{CC} = Max, V_I = 2.7V	–	–	20	μA
LOW Level Input Current	I_{IL}	V_{CC} = Max, V_I = 0.4V	–	–	−0.4	mA
Short Circuit Output Current	I_{OS}	V_{CC} = Max, Note 3	−20	–	−100	mA
Supply Current	I_{CC}	V_{CC} = Max, Note 4, Note 5, Note 6	–	12	20	mA

Note 2. All typicals are at V_{CC} = +5V, T_A = +25°C.

Note 3. Not more than one output should be shorted a a time, and the duration should not exceed one second.

Note 4. Quiescent I_{CC} is measured (after clearing) with 2,4V applied to all clear and A inputs, B inputs grounded, all outputs OPEN, C_{EXT} = 0.02μF, and R_{EXT} = 25kΩ.

Note 5. I_{CC} is measured in the triggering state with 2,4V applied to all clear and B inputs, A inputs grounded, all outputs OPEN, C_{EXT} = 0.02μF, and R_{EXT} = 25kΩ.

Note 6. 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 the clock.

Switching Characteristics: (V_{CC} = +5V, T_A = +25°C unless otherwise specified)

Parameter	Symbol	From (Input) To (Output)	R_L = 2kΩ				Unit
			C_L = 15pF, C_{EXT} = 0pF, R_{EXT} = 5kΩ		C_L = 15pF, C_{EXT} = 1000pF, R_{EXT} = 10kΩ		
			Min	Max	Min	Max	
Propagation Delay Time LOW−to−HIGH Level Output	t_{PLH}	A to Q	–	33	–	–	ns
Propagation Delay Time LOW−to−HIGH Level Output	t_{PLH}	B to Q	–	44	–	–	ns
Propagation Delay Time HIGH−to−LOW Level Output	t_{PHL}	A to $\overline{Q}$	–	45	–	–	ns

Switching Characteristics (Cont'd): (V_{CC} = +5V, T_A = +25°C unless otherwise specified)

Parameter	Symbol	From (Input) To (Output)	R_L = 2kΩ				Unit
			C_L = 15pF, C_{EXT} = 0pF, R_{EXT} = 5kΩ		C_L = 15pF, C_{EXT} = 1000pF, R_{EXT} = 10kΩ		
			Min	Max	Min	Max	
Propagation Delay Time HIGH−to−LOW Level Output	t_{PHL}	B to $\overline{Q}$	−	56	−	−	ns
Propagation Delay Time LOW−to−HIGH Level Output	t_{PLH}	Clear to $\overline{Q}$	−	45	−	−	ns
Propagation Delay Time HIGH−to−LOW Level Output	t_{PHL}	Clear to $\overline{Q}$	−	27	−	−	ns
Minimum Width of Pulse at Output Q	$T_{WQ(Min)}$	A or B to Q	−	200	−	−	ns
Output Pulse Width	$t_{W(out)}$	A or B to Q	−	−	4	5	μs

Function Table:

Inputs			Outputs	
CLEAR	A	B	Q	$\overline{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↑	Positive Pulse	Negative Pulse
H	↓	H	Positive Pulse	Negative Pulse
↑	L	H	Positive Pulse	Negative Pulse

H = HIGH Logic Level
L = LOW Logic Level
X = Can be either LOW or HIGH
↑ = Positive Going Transition
↓ = Negative Going Transition

Functional Description:

The basic output pulse width is determined by selection of an external resistor (R_X) and capacitor (C_X). Once triggered, the basic pulse width may be extended by retriggering the gated active−LOW transition or active−HIGH transition inputs or be reduced by use of the active−LOW or CLEAR input. Retriggering to 100% duty cycle is possible by application of an input pulse train whose cycle time is shorter than the output cycle time such that a continuous "HIGH" logic state is maintained at the "Q" output.

Operating Rules:

1. An external resistor (R_X) and an external capacitor (C_X) are required for proper operation. The value of C_X may vary from 0 to any necessary value. For small time constants high−grade mica, glass, polypropylene, polycarbonate, or polystyrene material capacitors may be used. For large time constants use tantalum or special aluminum capacitors. If the timing capacitors have leakages approaching 100nA or if stray capacitance from either terminal to ground is greater than 50pF the timing equations may not represent the pulse width the device generates.
2. When an electrolytic capacitor is used for C_X a switching diode is ofter required for standard TTL one−shots to prevent high inverse leakage current. This witching diode is not needed for th NTE74LS123 one−shot and should not be used. In general, the use of the switching diode ias not recommended with retriggerable operation.

Pin Connection Diagram