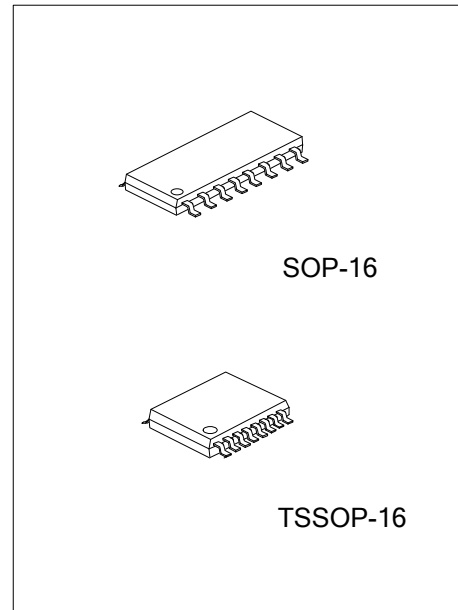




U74HC123

CMOS IC

DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATOR WITH RESET



DESCRIPTION

The **U74HC123** is high-speed Si-gate CMOS device and is pin compatible with low power Schottky TTL (LSTTL).

The U74HC123 is a dual retriggerable monostable multivibrator with output pulse width control by three methods. The basic pulse time is programmed by selection of an external resistor (R_{EXT}) and capacitor (C_{EXT}).

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. Alternatively an output delay can be terminated at any time by a LOW-going edge on input $n\bar{R}_D$, which also inhibits the triggering.

An internal connection from $n\bar{R}_D$ to the input gates makes it possible to trigger the circuit by a positive-going signal at input $n\bar{R}_D$ as shown in the function table. The basic output pulse width is essentially determined by the values of the external timing components R_{EXT} and C_{EXT} .

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

FEATURES

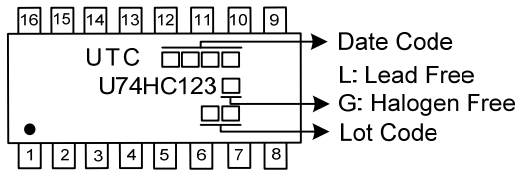
- * DC triggered from active HIGH or active LOW inputs
- * Retriggerable for very long pulses up to 100% duty factor
- * Direct reset terminates output pulse
- * Schmitt-trigger action on all inputs except for the reset input

ORDERING INFORMATION

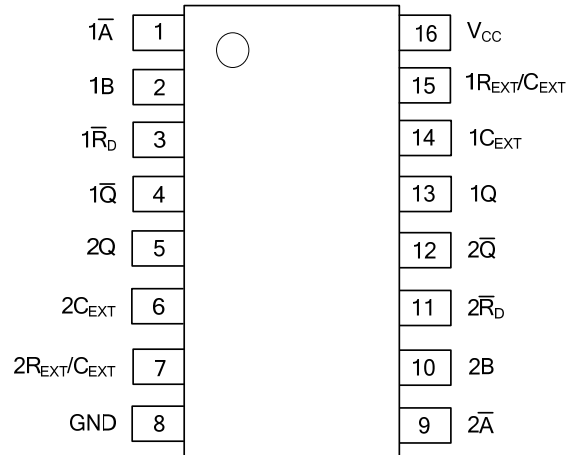
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC123L-S16-R	U74HC123G-S16-R	SOP-16	Tape Reel
U74HC123L-P16-R	U74HC123G-P16-R	TSSOP-16	Tape Reel

<p>U74HC123G-S16-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) S16: SOP-16, P16: TSSOP-16 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
---	--

MARKING



PIN CONFIGURATION

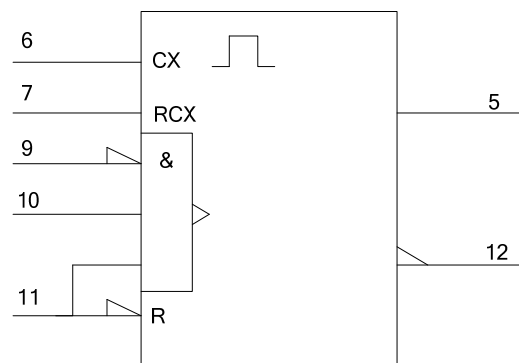
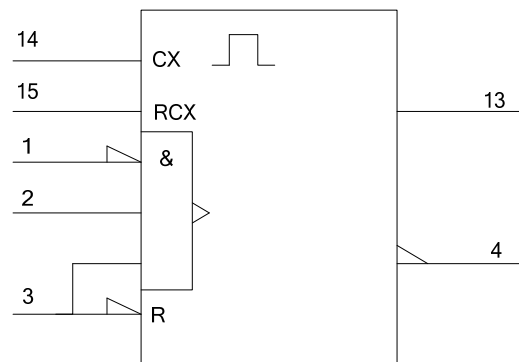
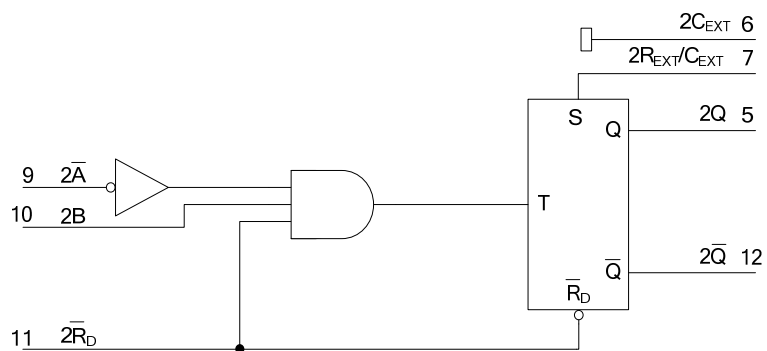
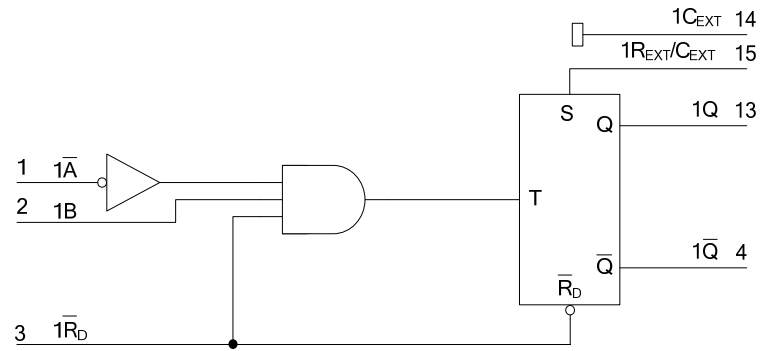


FUNCTION TABLE

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

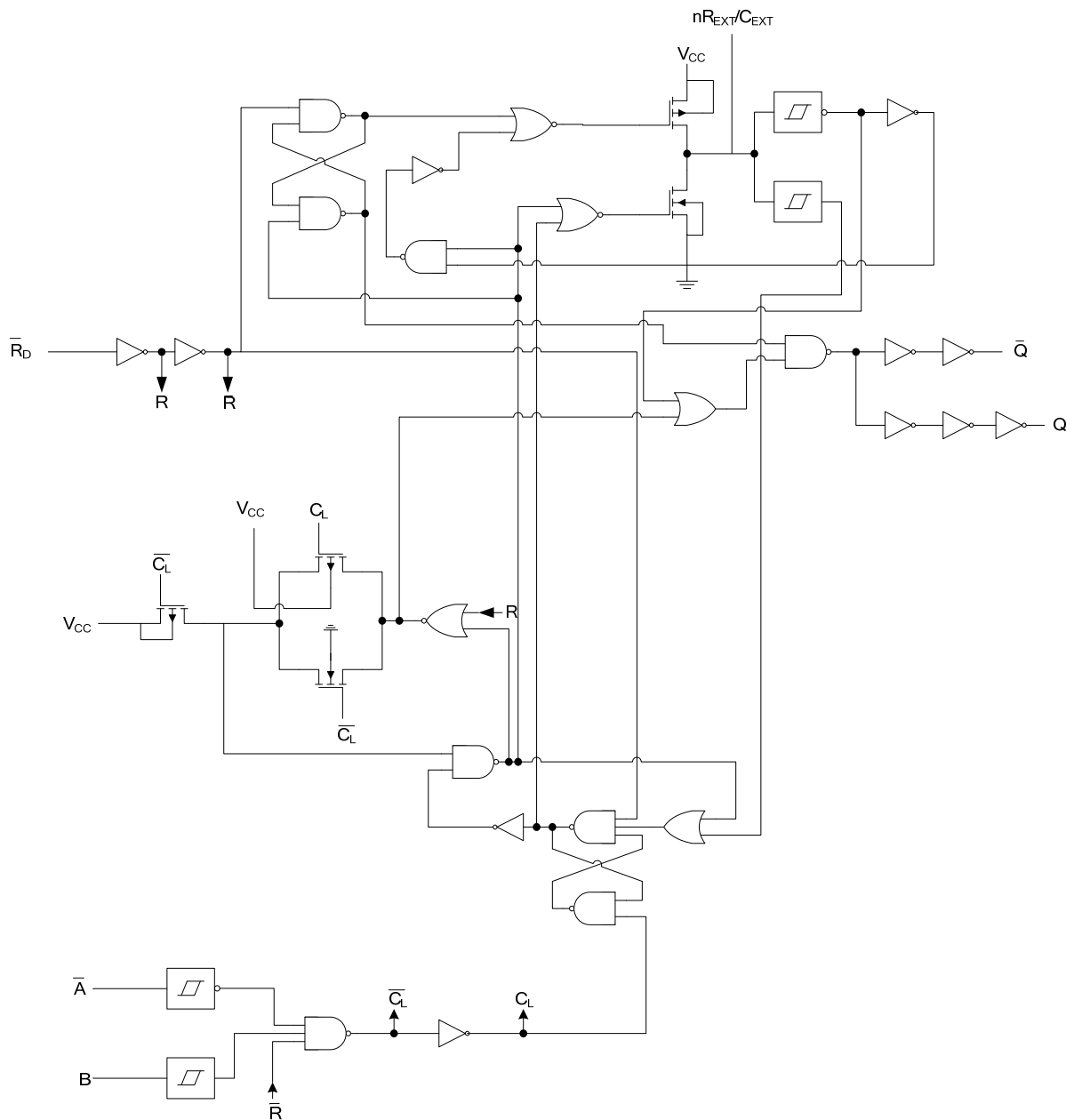
Notes: 1. H: HIGH voltage level L: LOW voltage level X: don't care ↑: LOW-to-HIGH transition
 ↓: HIGH-to-LOW transition ⌋: one HIGH level output pulse ⌋: one LOW level output pulse
 2. If the monostable was triggered before this condition was established, the pulse will continue as programmed.

■ LOGIC SYMBOL



IEC logic symbol

■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 7	V
V_{CC} or GND Current	I_{CC}	±50	mA
Output Current	I_{OUT}	±25	mA
Input Clamp Current	I_{IK}	±20	mA
Output Clamp Current	I_{OK}	±20	mA
Storage Temperature	T_{STG}	-65 ~ + 150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
 Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2	5	6	V
High-level Input Voltage	V_{IH}	$V_{CC}=2V$	1.5	1.2		V
		$V_{CC}=4.5V$	3.15	2.4		
		$V_{CC}=6V$	4.2	3.2		
Low-level Input Voltage	V_{IL}	$V_{CC}=2V$		0.8	0.5	V
		$V_{CC}=4.5V$		2.1	1.35	
		$V_{CC}=6V$		2.8	1.8	
Input Voltage	V_{IN}		0		V_{CC}	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise and Fall Rate $n\bar{R}_D$ Input	$\Delta t/\Delta V$	$V_{CC}=2V$			1000	ns
		$V_{CC}=4.5V$			500	
		$V_{CC}=6V$			400	
Ambient Temperature	T_{amb}		-40	+25	+125	°C

■ ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage High-Level	V_{OH}	$V_{CC}=2V, I_{OH}=-20\mu A$	1.9	2		V
		$V_{CC}=4.5V, I_{OH}=-20\mu A$	4.4	4.5		
		$V_{CC}=6V, I_{OH}=-20\mu A$	5.9	6		
		$V_{CC}=4.5V, I_{OH}=-4mA$	3.98	4.32		
		$V_{CC}=6V, I_{OH}=-5.2mA$	5.48	5.81		
Output Voltage Low-Level	V_{OL}	$V_{CC}=2V, I_{OL}=20\mu A$		0	0.1	V
		$V_{CC}=4.5V, I_{OL}=20\mu A$		0	0.1	
		$V_{CC}=6V, I_{OL}=20\mu A$		0	0.1	
		$V_{CC}=4.5V, I_{OL}=4mA$		0.15	0.26	
		$V_{CC}=6V, I_{OL}=5.2mA$		0.16	0.26	
Input Leakage Current	$I_{(LEAK)}$	$V_{CC}=6V, V_{IN}=V_{CC}$ or GND			±0.1	μA
Quiescent Supply Current	I_{CC}	$V_{CC}=6V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			8	μA
Input Capacitance	C_I			3.5		pF

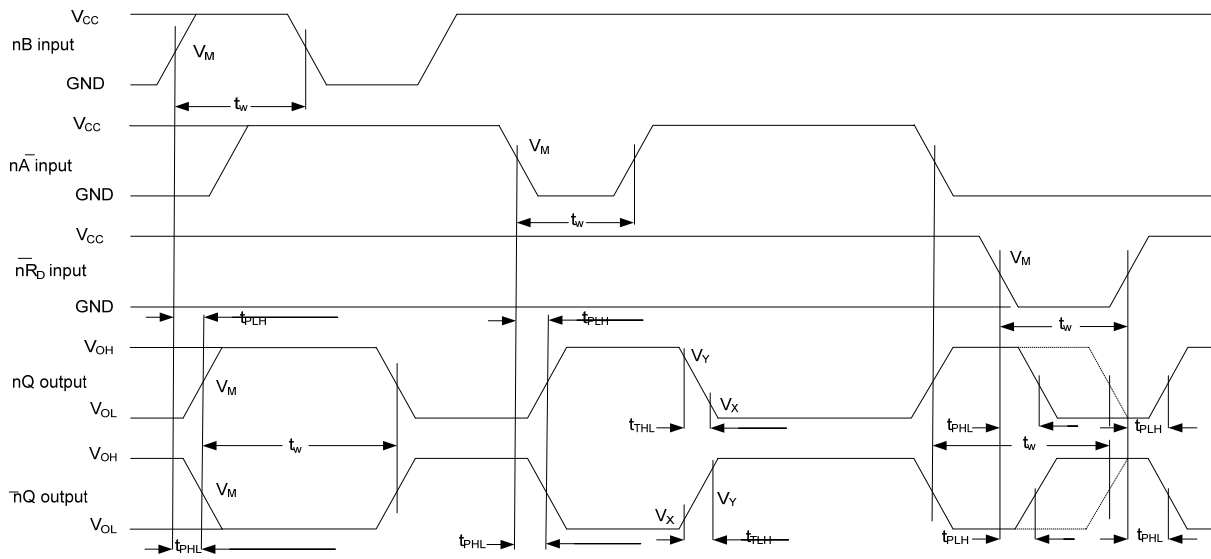
■ SWITCHING CHARACTERISTICS ($t_r = t_f = 6\text{ns}$, $C_L = 50\text{pF}$, $T_A = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Propagation Delay Time From $n\bar{A}$, nB to nQ or $n\bar{Q}$	t_{PLH}/t_{PHL}	$V_{CC}=2V$		83	255	ns	
		$V_{CC}=4.5V$		30	51		
		$V_{CC}=5V, C_L=15p$	$C_{EXT}=0pF$ $R_{EXT}=5k$		26		
		$V_{CC}=6V$		24	43		
Propagation Delay Time From $n\bar{R}_D$ to nQ or $n\bar{Q}$	t_{PLH}/t_{PHL}	$V_{CC}=2V$		66	215	ns	
		$V_{CC}=4.5V$		24	43		
		$V_{CC}=5V, C_L=15p$	$C_{EXT}=0pF$ $R_{EXT}=5k$		20		
		$V_{CC}=6V$		19	37		
Output transition time	t_t	$V_{CC}=2V$		19	75	ns	
		$V_{CC}=4.5V$		7	15		
		$V_{CC}=6V$		6	13		
Trigger pulse width $n\bar{A} = \text{LOW}$	t_w	$V_{CC}=2V$	100	8		ns	
		$V_{CC}=4.5V$	20	3			
		$V_{CC}=6V$	17	2			
Trigger pulse width $nB = \text{HIGH}$	t_w	$V_{CC}=2V$	100	17		ns	
		$V_{CC}=4.5V$	20	6			
		$V_{CC}=6V$	17	5			
Reset pulse width $n\bar{R}_D = \text{LOW}$	t_w	$V_{CC}=2V$	100	14		ns	
		$V_{CC}=4.5V$	20	5			
		$V_{CC}=6V$	17	4			
Output pulse width $nQ = \text{HIGH}$, $n\bar{Q} = \text{LOW}$	t_w	$V_{CC}=5V, C_{EXT}=100nF, R_{EXT}=10k$		450		μs	
Output pulse width $nQ = \text{HIGH}$, $n\bar{Q} = \text{LOW}$	t_w	$V_{CC}=5V, C_{EXT}=0pF, R_{EXT}=5k$		75		ns	
Retrigger time $n\bar{A}$, nB	t_{rt}	$V_{CC}=5V, C_{EXT}=0pF, R_{EXT}=5k$		110		ns	
External timing resistor	R_{EXT}	$V_{CC}=2V$	10		1000	$k\Omega$	
		$V_{CC}=5V$	2		1000		
External timing capacitor	C_{EXT}	$V_{CC}=5V$	2		10000	pF	

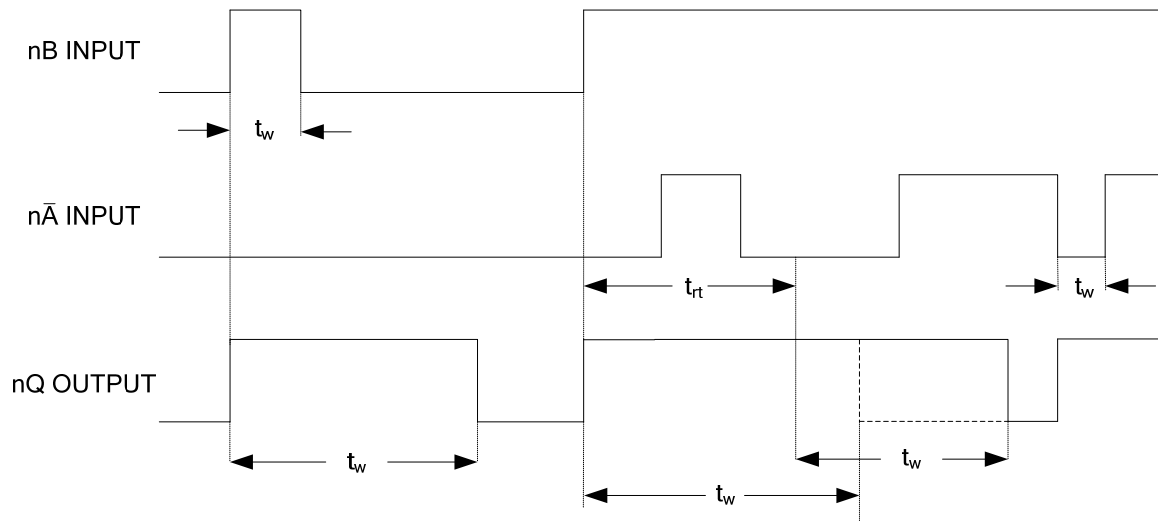
■ OPERATING CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance Per monostable	C_{PD}			54		pF

■ TEST CIRCUIT AND WAVEFORMS

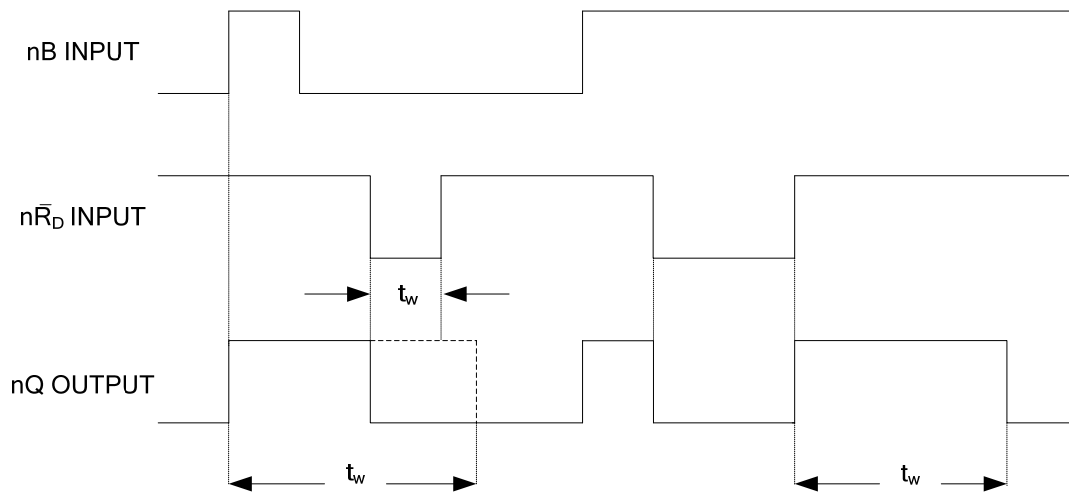


Propagation delays from inputs (nA, nB, nRD) to outputs (nQ, nQ) and output transition times

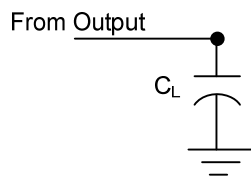


Output pulse control using retrigger pulse; nRD=HIGH

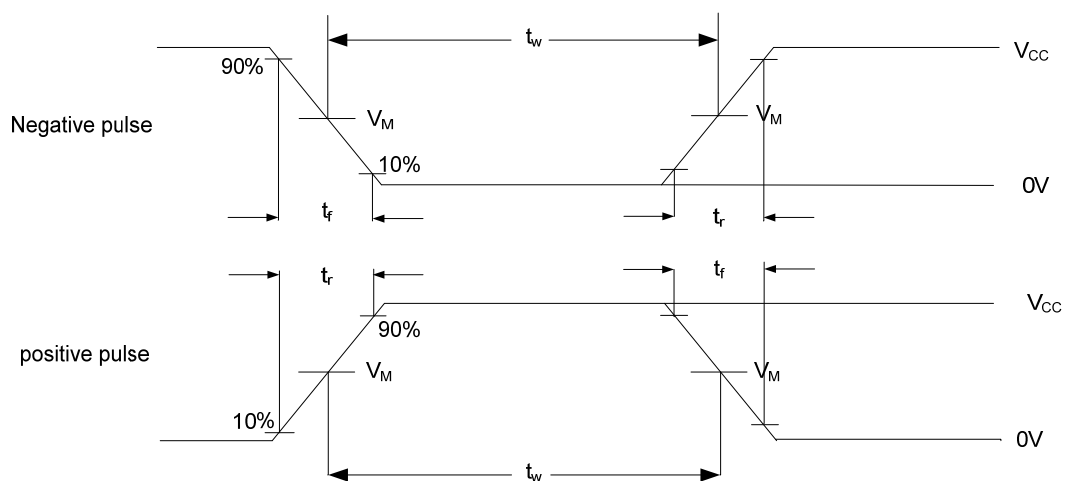
■ TEST CIRCUIT AND WAVEFORMS(Cont.)



Output pulse control using input in nR_D; nA=LOW



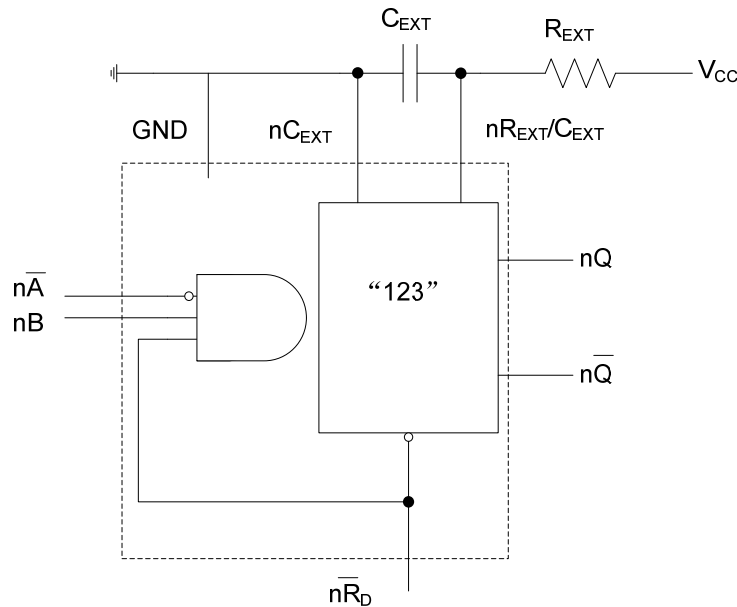
TEST CIRCUIT



APPLICATION INFORMATION

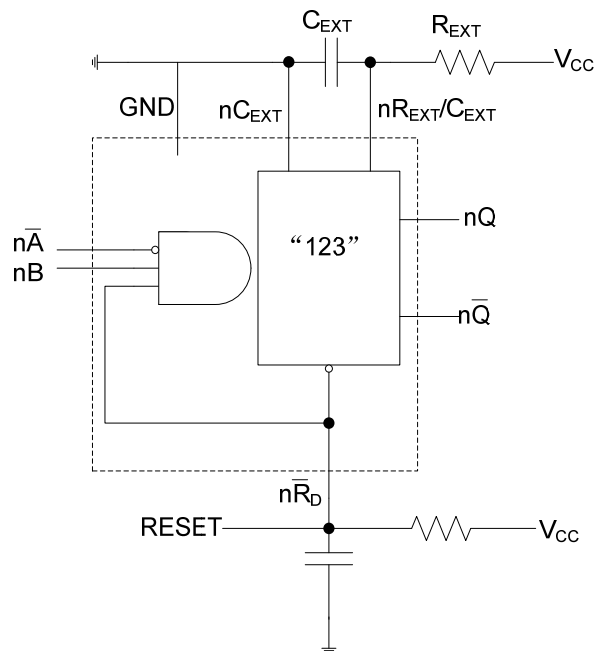
Timing component connections

The basic output pulse width is essentially determined by the values of the external timing components R_{EXT} and C_{EXT} .



Power-up considerations

When the monostable is powered-up it may produce an output pulse, with a pulse width defined by the values of R_{EXT} and C_{EXT} , this output can be eliminated using the circuit below.

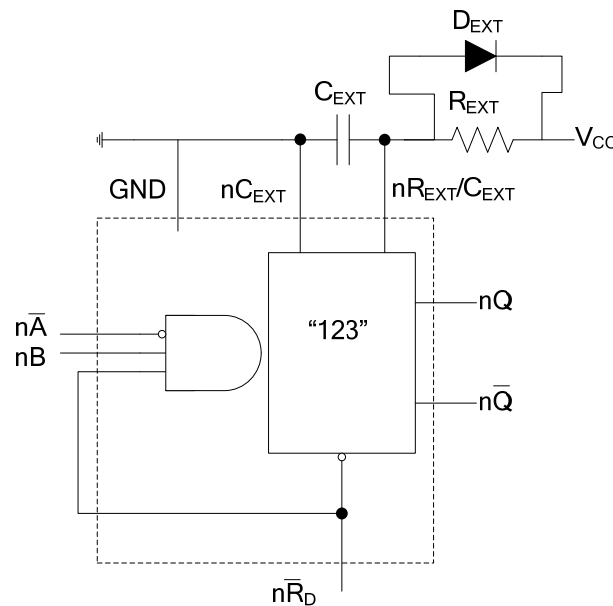


Power-up output pulse elimination circuit

■ APPLICATION INFORMATION(Cont.)

Power-down considerations

A large capacitor (C_{EXT}) may cause problems when powering-down the monostable due to the energy stored in this capacitor. When a system containing this device is powered-down or a rapid decrease of V_{CC} to zero occurs, the monostable may sustain damage, due to the capacitor discharging through the input protection diodes. To avoid this possibility, use a damping diode (D_{EXT}) preferably a germanium or Schottky type diode able to withstand large current surges and connect as shown below.



Power-down protection circuit

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.