Precision Timer

Description：

NE555 is a bipolar integrated circuit that can generate high-precision timing pulses. The internal circuit consists of four parts: threshold comparator, trigger comparator, RS trigger, and output circuit. It can be composed of timing trigger circuits, pulse width modulation circuits, audio oscillators, and other circuits by connecting a small number of external resistive and capacitive devices.Packaging situation using SOP8 and DIP8

Features：

-High timing accuracy

-Strong output driving ability

-High temperature stability

-The maximum operating frequency can reach over 500KHZ

-Compatible with TTL circuits

-The timing time can range from microseconds to hours (precise control can be achieved through external resistors and capacitors)

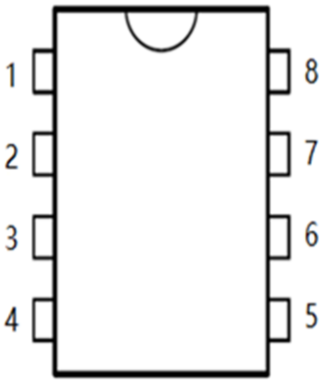
Application：

-Pulse width modulation

-Audio pulse generator, frequency divider

-Equipment timing, traffic light control, access control

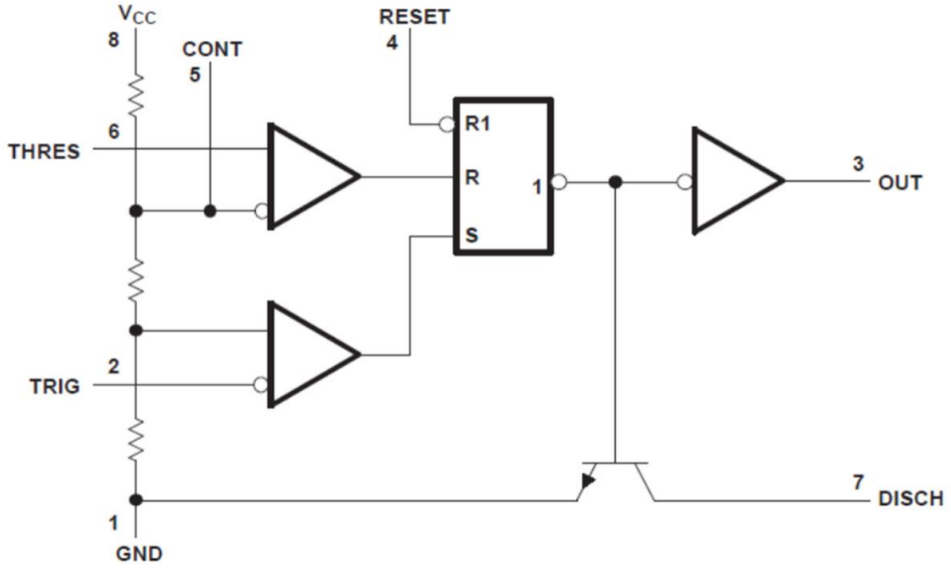
Pin Assignment：



(DIP8/SOP8)

Pin No.	Pin Definition	Function Description
1	GND	grounding
2	TRIG	trigger
3	OUT	output
4	REST	reset
5	CONT	control voltage
6	THRES	threshold
7	DISCH	discharge
8	Vcc	Power supply terminal

Block Diagram：



NE555

Absolute Maximum Ratings

Parameter	Symbol	Limit value	Unit
supply voltage	V_{CC}	18	V
INPUT VOLTAGE	VI (thre, trig, cont, reset)	VCC	V
output current	Io	± 220	mA
Dissipated power	P_D	400	mW
operation temperature	T_A	-20～70	℃
storage temperature	T_S	-65～150	℃
welding temperature	T_W	260,10s	℃

Note： Limit parameters refer to the limit values that cannot be exceeded under any conditions. If this limit value is exceeded, it may cause physical damage such as product deterioration; At the same time, it cannot be guaranteed that the chip can operate normally when approaching the limit parameters.

Recommended electrical parameters

Parameter	Symbol	Value	Unit
supply voltage	VCC	4.5～15	V
Max input voltage	Vth, Vtrig, Vcont, Vreset	VCC	V
output current	Io	± 200	mA

Electrical characteristics (TA=25℃，Unless otherwise specified)

Parameter	Symbol	Test conditions		MIN	TYP	MAX	Unit
working voltage	Vcc			4.5	-	15	V
working current	Icc	Vcc=5V,RL=∝,VO=VOL		-	3	6	mA
		Vcc=5V,RL=∝,VO=VOH		-	1.5	5	mA
		VCC=15V,RL=∝,VO=VOL		-	8	15	mA
		VCC=15V,RL=∝,VO=VOH		-	6	13	mA
Control terminal voltage	Vcl	VCC=15V		-	10	11	V
		VCC=5V		-	3.3	4	V
Threshold voltage terminal voltage	VTH	VCC=15V		-	10	11.2	V
		VCC=5V		-	3.3	4.2	V
Threshold voltage and current	ITH *note1	VCC=15V,VTH=0V		-	-	250	nA
Trigger terminal voltage	VTRIG	VCC=15V		-	5	5.6	V
		VCC=5V		-	1.6	2.2	V
Trigger terminal current	ITRIG	VCC=15V,VTRIG =0V,		-	-	2	uA
Reset terminal high voltage	VRESETH	VCC=5V		1.5	-	VCC	V
Low voltage at reset end	VRESETL	VCC=5V		GND	-	0.5	V
Reset terminal current	IRESET	VRESET =0.4V,Vcc=15V		-	0.13	0.4	mA
		VRESET =0V,Vcc=15V		-	0.3	1.5	mA
Output Low Voltage	VOL	VCC=15V,IL =-5mA		-	0.02	0.25	V
		VCC=15V,IL =-50mA		-	0.04	0.75	
		VCC=15V,IL =-100mA		-	2	2.5	
		VCC=15V,IL =-200mA		-	2.8	-	
		VCC=5V,IL =-5mA		-	0.08	0.35	
		VCC=5V,IL =-8mA			0.15	0.4	
Output High Voltage	VOH	VCC=15V,IL =-100mA		12.75	13.3	-	V
		VCC=15V,IL =-200mA		-	12.2	-	
		VCC=5V,IL =-100mA		2.75	3.3	-	
Discharge tube closing leakage current	Idis (off)	VO=VOH,Vdis = 10V		-	-	100	nA
Discharge tube saturation voltage	Vdis(sat)	VO=VOL	VCC=15V,Idis=15mA	-	140	480	mV
			VCC=5V,Idis=4.5mA	-	100	200	mV
Output rising edge time	tR	CL=15pF,		-	80	300	ns
Output falling edge time	tF	CL=15pF,		-	50	300	ns
timing error (Monostable state)	Ts*note2	RA=2kΩ to100kΩ C=0.1uF	VCC=15V, initial error	-	1	-	%
	Tv		Drift with power supply voltage (4.5V~15V)	-	0.1	-	%/V
	Tt		VCC=15V, drift with temperature (0-60 ℃)	-	150	-	ppm℃
timing error (Non steady state)	Ts*note2	RA、RB=1kΩ to100kΩ C=0.1uF	VCC=15V, initial error	-	1	-	%
	Tv		Drift with power supply voltage (4.5V~15V)	-	0.1	-	%/V
	Tt		VCC=15V, drift with temperature (0-60 ℃)	-	150	-	ppm℃

Notes： 1. At Vcc=15V, the maximum value of Ra+Rb is 10M Ω; At Vcc=5V, the maximum value of Ra +Rb is 3.4M Ω.

2. Timing error is defined as the difference between the measured value and the average value of the random sample. At the same time, timing errors are affected by errors in external capacitors and resistors.

Typical Applications

1、Monostable state:

In monostable mode, when the input level reaches 1/3 Vcc, the circuit triggers the output high level, and after holding t=1.1 * RA * C for a time, the output becomes low level . During time t, regardless of the input level, the output state is not affected. The circuit and waveform are shown in Figures 1 and 2.

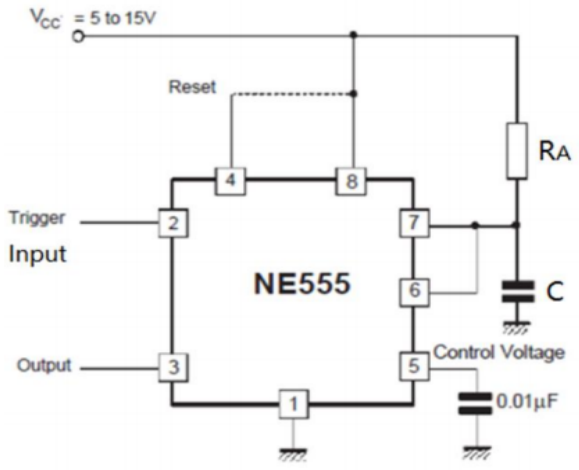


Figure 1. Monostable Circuit

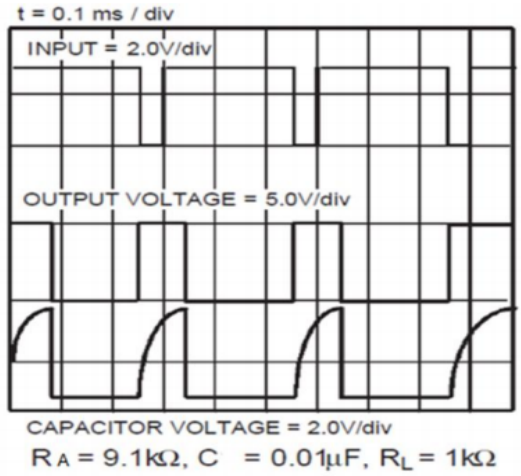


Figure 2 Monostable waveform diagram

2、Non steady state:

In non-stationary mode, the circuit will automatically trigger and output as a square wave multivibrator. The output square wave frequency and duty cycle can be adjusted by the size of RA, RB, and C. The triggering mode, charging and discharging time, and frequency are independent of the power supply voltage. The circuit and waveform are shown in Figures 3 and 4.

Output high-level pulse width th=0.693 * (RA+RB) * C; Low level pulse width tl=0. 693 * RB * C; T=th+tl=0.693 (RA+2RB) C; Frequency f=1/T=1.44/(RA * C+2RB * C); Duty cycle D=tl/T=RB/(RA+2RB).

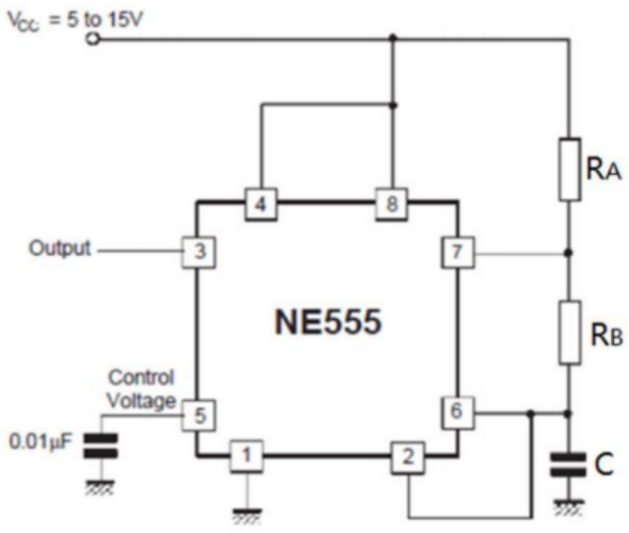


Figure 3. Monostable Circuit

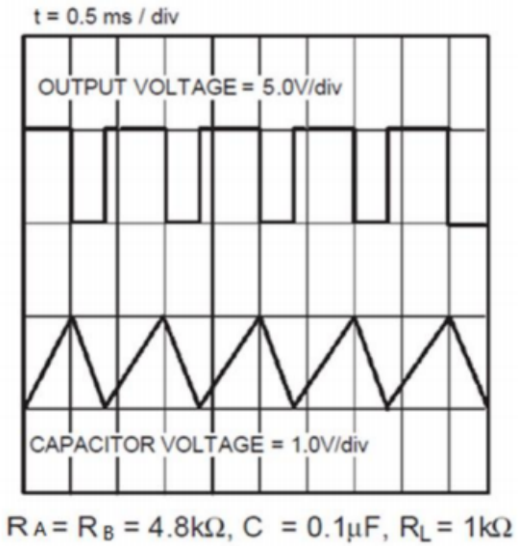


Figure 4. Non-stationary waveform

3、Pulse width modulation:

When the timer is connected in monostable mode and triggered by a continuous pulse train applied to pin 2, the output pulse width can be modulated by the signal applied to pin 5. See Figures 5 and 6.

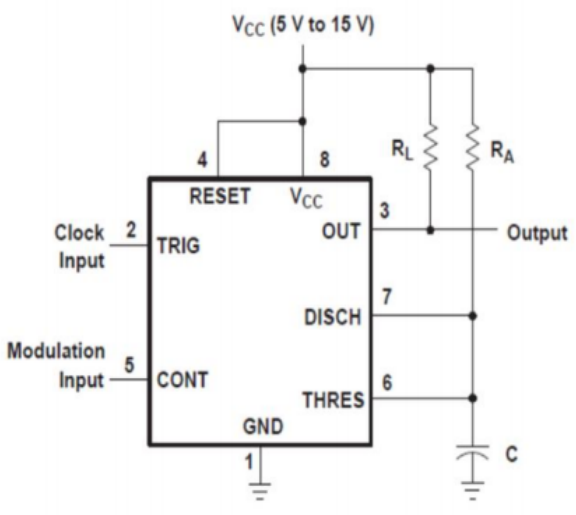


Figure 5. Pulse width modulation circuit

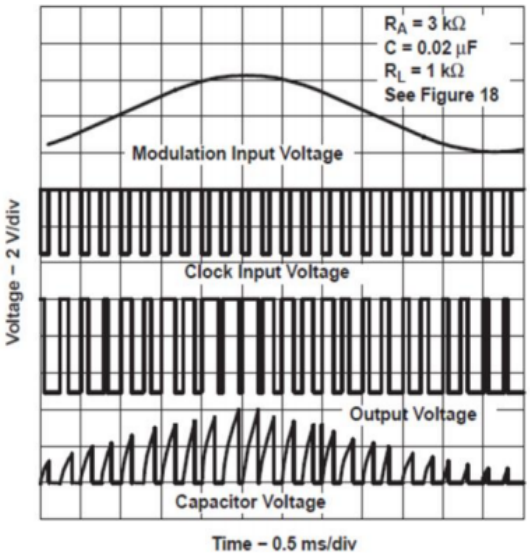


Figure 6 Pulse width modulation circuit waveform diagram

4、Pulse-position modulation:

When the timer is connected in Figure 7, the output pulse position can be modulated by the signal applied to pin 5. See Figures 7 and 8.

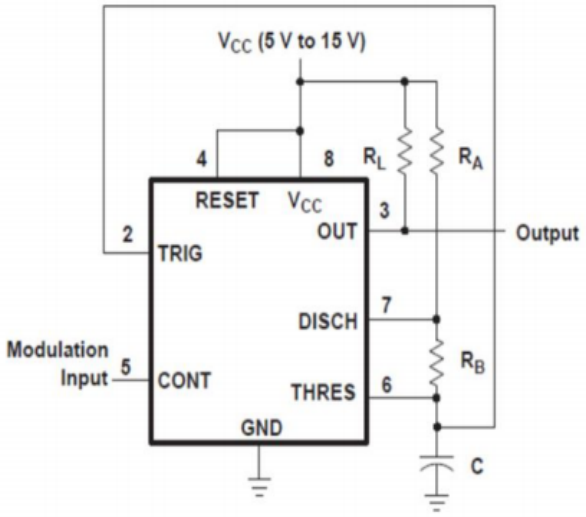


Figure 7 Pulse-position modulation circuit

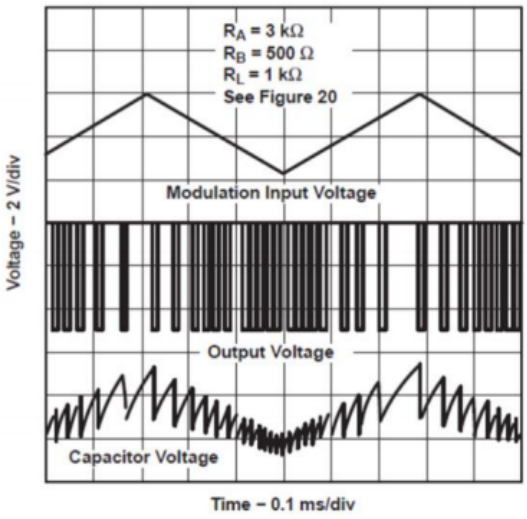
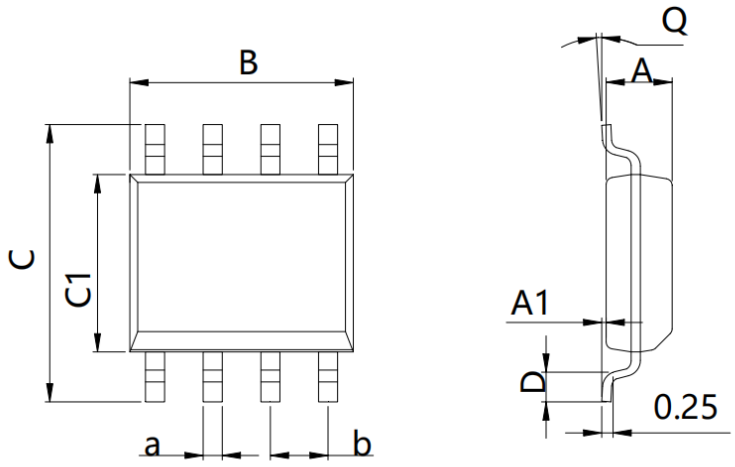


Figure 8 Pulse-position modulation circuit waveform diagram

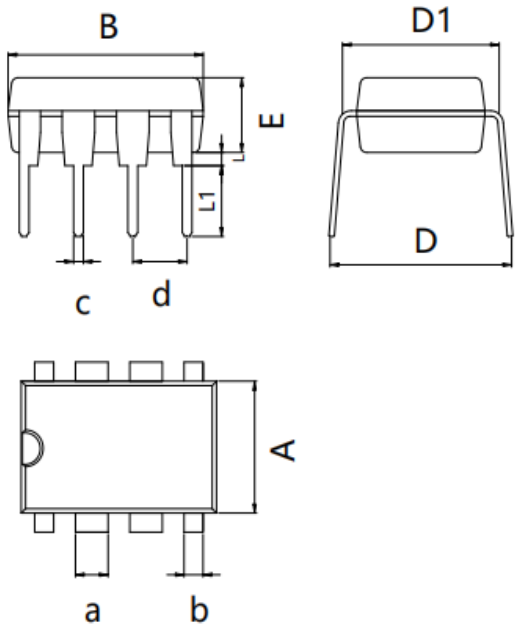
PACKAGE MECHANICAL DATA

SOP8



Dimensions In Millimeters(SOP8)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

DIP8



Dimensions In Millimeters(DIP8)											
Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	9.00	8.40	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	9.50	9.00	7.82	3.55	0.70	3.60	1.55	0.90	0.50	