ÿ Product Introduction

The NE555DR is a bipolar integrated circuit capable of generating high-precision timing pulses. Internally, it consists of four circuit parts: a threshold comparator, a trigger comparator, an RS flip-flop, and an output circuit. By connecting a few external resistors and capacitors, it can be used to construct timing trigger circuits, pulse width modulation circuits, audio oscillators, and other circuits. It is widely used in toys, traffic signaling, automation control, and other fields.

ÿ Product Features

- High timing accuracy; maximum operating frequency up to 500kHz; strong output drive capability; compatible with TTL circuits; good
- temperature stability; package types: SOP8, DIP8; timing time from microseconds to hours (precisely controllable
- via external resistors and capacitors).

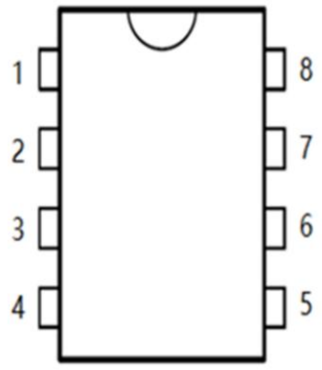
ÿ Product Uses

- Audio pulse generator, frequency divider
- Equipment timing, traffic light control, access control
- Pulse width modulation and pulse phase modulation
- industrial control

ÿ Package type and pin function definition

Pin number	Pin Definitions	Pin Function Description:
1	GND	Power Ground
2	Trig	Trigger
3	Output	output
4	Reset	reset
5	Cont	Control voltage
6	Tres	Threshold
7	Disch	discharge
8	VCC	Power positive

DIP8/SOP8



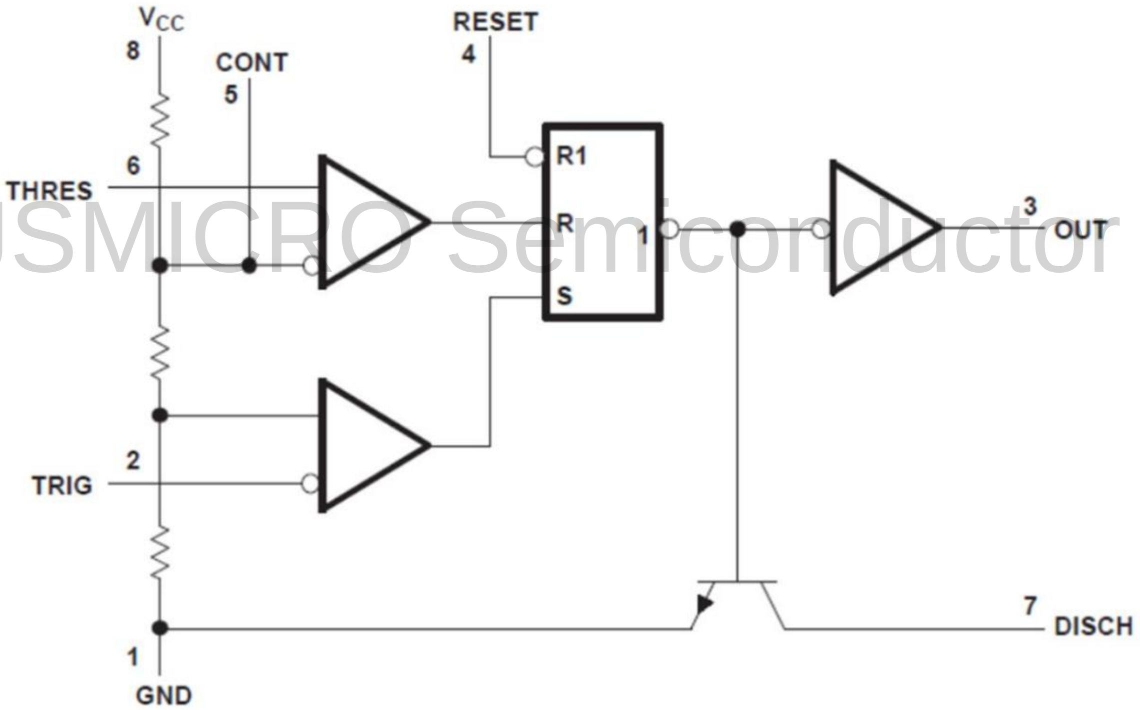
ÿ Limiting parameters

	symbol	Limit value	unit
Parameters: Power	VCC	18	In
supply voltage, Input	VI (thre, trig, cont, reset)	VCC	In
voltage, Output	This	±220	m.a.
current, Power	PD	400	mW
dissipation,	FACING	-20ÿ70	ÿ
Operating	TS	-65ÿ150	ÿ
temperature, Storage temperature, Welding temperature	TW	260,10s	ÿ

Note: Limit parameters refer to the absolute values that must not be exceeded under any conditions. Exceeding these limits may cause physical damage such as product deterioration.

At the same time, the chip cannot be guaranteed to work properly when approaching its limits.

ÿ Principle Block Diagram



ÿ Recommended electrical parameters

Project	symbol	Parameter value	unit
power supply	VCC	4.5ÿ15	In
voltage, maximum input voltage Vth, Vtrig, Vcont, Vreset, output current		VCC	In
	This	±200	m.a.

ÿ Electrical properties (TA=25ÿ, unless otherwise specified)

Project	symbol	condition		Minimum value	Typical value	Maximum value	unit
operating voltage	VCC			4.5		15	In
Operating current ICC		VCC =5V, RL =ÿ,VO=VOL			3	6	m.a.
		VCC =5V, RL =ÿ,VO=VOH			1.5	5	m.a.
		VCC =15V, RL =ÿ, VO=VOL			8	15	m.a.
		VCC =15V, RL =ÿ,VO=VOH			6	13	m.a.
Control terminal voltage VCL		VCC =15V			10.0	11	In
		VCC =5V			3.3	4	In
Threshold voltage terminal voltage VTH		VCC =15V			10.0	11.2	In
		VCC =5V			3.3	4.2	In
ITH threshold voltage and current	*note1	VCC =15V, VTH =0V				250	nA
Trigger voltage VTRIG		VCC =15V			5.0	5.6	In
		VCC =5V			1.6	2.2	In
Trigger current I	TRIG	VCC =15V, VTRIG =0V,				2	a
Reset terminal high voltage	VRESETH	VCC =5V		1.5		VCC	In
Low voltage at reset terminal	VRESETL	VCC =5V		GND		0.5	In
Reset current IRESET		VRESET =0.4V, VCC =15V			0.13	0.4	m.a.
		VRESET =0V,VCC =15V			O.3	1.5	m.a.
Output low voltage VOL		VCC =15V, IL =-5mA			0.02	0.25	In
		VCC =15V, IL =-50mA			0.04	0.75	
		VCC =15V, IL =-100mA			2.0	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		In
		VCC =15V, IL =-200mA			12.2		
		VCC =5V, IL =-100mA		2.75	3.3		
The discharge tube shuts off leakage current Idis (off).		VO=VOH, Vdis = 10V				100	nA
The saturation voltage of the discharge tube is Vdis(sat), where VO = VOL.			VCC=15V, Idis=15mA		140	480	mV
			VCC=5V, Idis=4.5 mA		100	200	mV
Output rise time t Output fall time	R	CL=15pFÿ			80	300	ns
	tF	CL=15pF			50	300	ns
Timing error (Mostable)	Ts*note 2	RA=2kÿ to	VCC=15V, initial error		1		%
	Tv	100kÿ	Drifts with power supply voltage (4.5Vÿ15V)		0.1		%/V
	Tt	C=0.1uF	VCC=15V, drifts with temperature (0ÿ60ÿ)		150		ppmÿ
Timing error (Non-steady state)	Ts*note2	RAÿRB=1kÿ	VCC=15V, initial error		1		%
	Tv	Up to 100kÿ	Drifts with power supply voltage (4.5Vÿ15V)		0.1		%/V
	Tt	C=0.1u F	VCC=15V, drifts with temperature (0ÿ60ÿ)		150		ppmÿ

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

2. Timing error is defined as the difference between the measured value and the mean of a random sample. Timing error is also affected by the errors of external capacitors and resistors.

ÿ Typical Application Circuit

1. Monostable:

In monostable mode, when the input level reaches 1/3 Vcc, the circuit triggers a high-level output, which remains high for t = 1.1 * RA * C.

The output goes low. During time t, the output state remains unaffected regardless of the input level. The circuit and waveforms are shown in Figures 3 and 4.

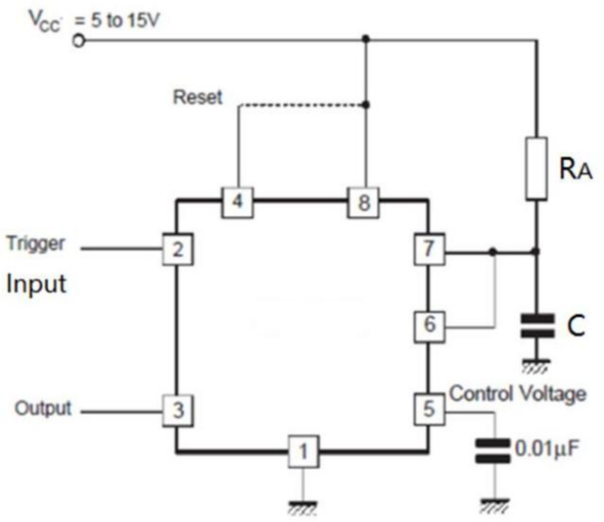


Figure 3 Monostable circuit

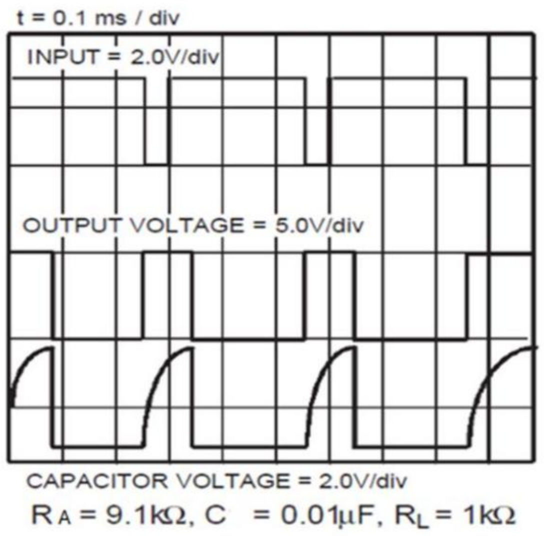


Figure 4 Monostable waveform

2. Unsteady state:

In non-steady-state mode, the circuit automatically triggers, producing a multivibrator with a square wave output. The output square wave frequency and duty cycle can be determined via RA,

The values of RB and C are adjusted. Its trigger mode, charging and discharging time, and frequency are independent of the power supply voltage. The circuit and waveforms are shown in Figures 5 and 6.

The output high-level pulse width th = 0.693 * (RA + RB) * C; the 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).

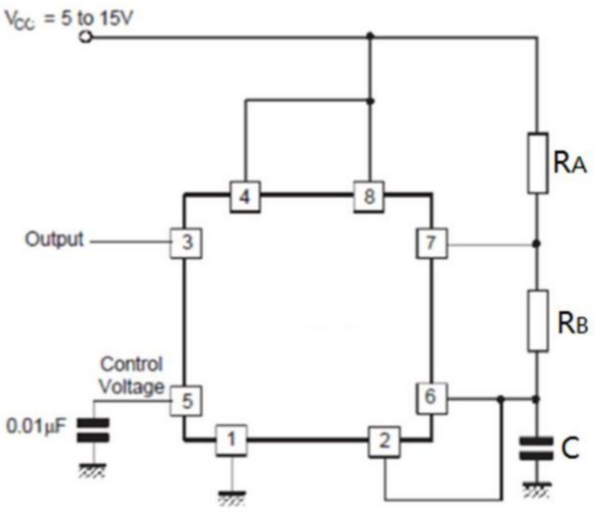


Figure 5 Unstable circuit

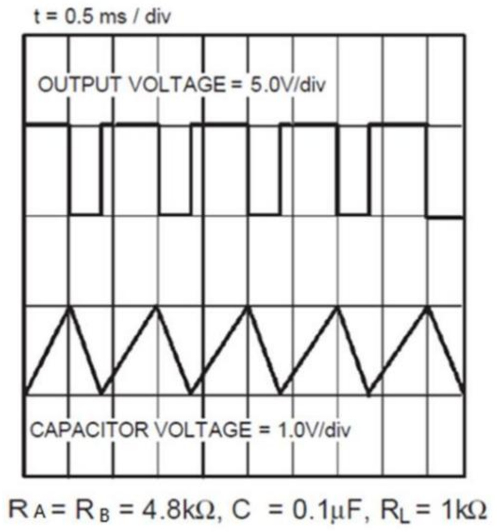


Figure 6 Unsteady-state waveform diagram

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 determined by applying a pulse train to pin 5.

The signal is modulated. See Figures 7 and 8.

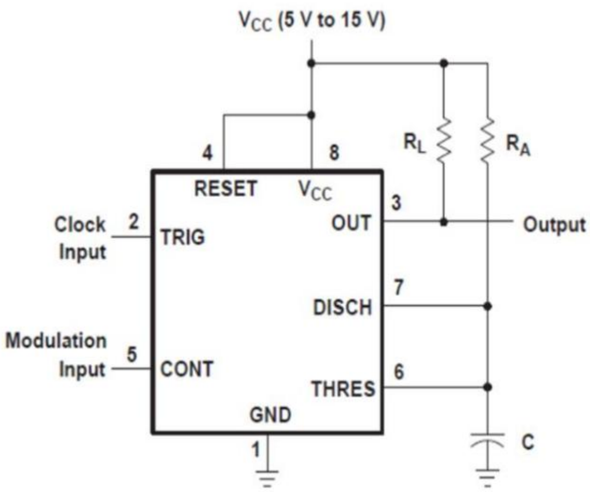


Figure 7 Pulse Width Modulation Circuit

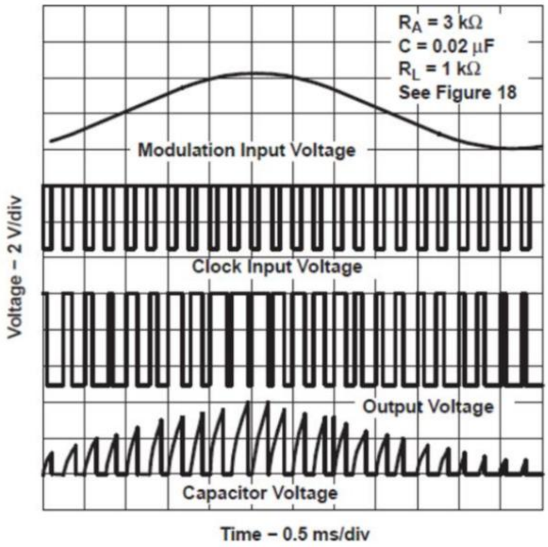


Figure 8. Waveform diagram of pulse width modulation circuit

4. Pulse position modulation:

When the timer is connected as shown in Figure 9, the output pulse position can be modulated by the signal applied to pin 5. See Figures 9 and 10.

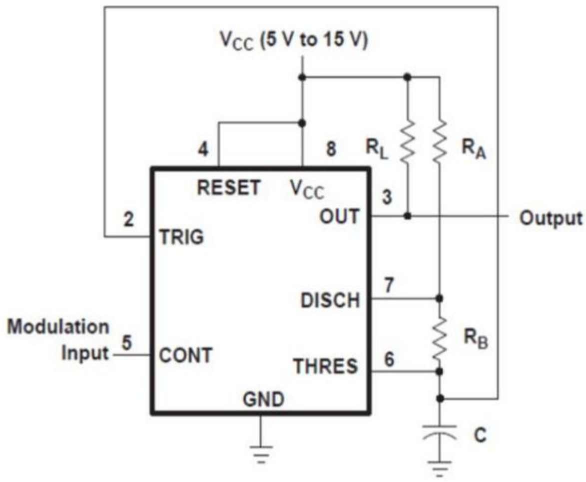


Figure 9 Pulse position modulation circuit

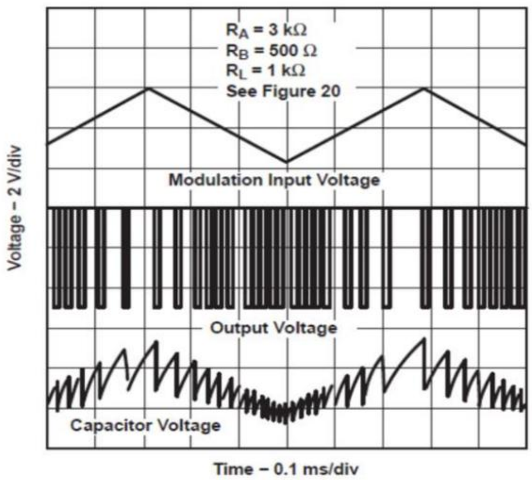
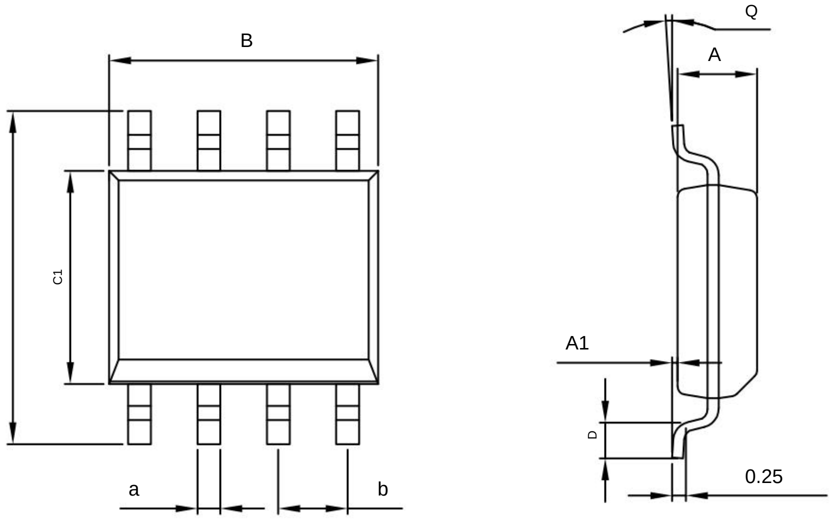


Figure 10 Waveform diagram of pulse position modulation circuit

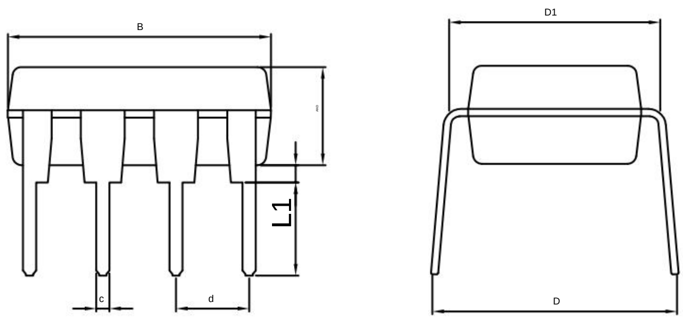
Package outline drawing

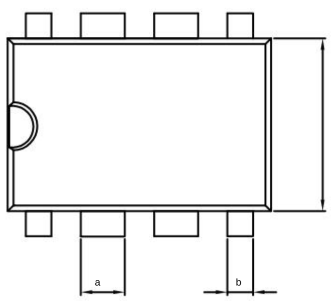
SOP8



UNIT:mm							
DIM.	MIN	TYPE	MAX	DIM.	MIN	TYPE	MAX
A	4.520 4.570 4.620 0.100 0.250			a	0.400 0.420 0.440		
A1				b	1.260 1.270 1.280		
B	4.800 4.920 5.100			Q	0°		8°
C	5.800 6.100 6.250						
C1	3.800 3.900 4.000						
D	0.400		0.950				

DIP8





UNIT:mm							
DIM.	MIN		MAX	DIM.	MIN		MAX
A	TYPE 6,100 6,300 6,680 9,000			a	TYPE 1.504 1.524 1.544		
B	9,200 9,500			b		0.889	
D	8.400 8.700 9.000			c	0.437 0.457 0.477		
D1	7.42 7.62 7.82			d	2.530 2.540 2.550		
AND	3.100 3.300 3.550			L	0.500 -		0.700
				L1	3.000 3.200 3.600		