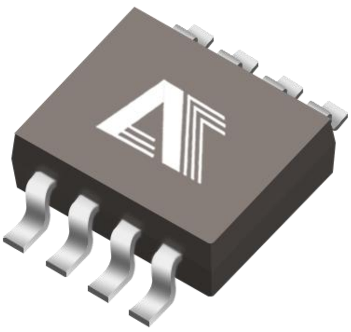
AOTE SEMICONDUCTOR



# 555Timer/Timer

# NE555DR

## Product Data Sheet

AOTE DCC
RELEASE

## ◆ Summary ：

NE555 is a bipolar integrated circuit capable of generating high-precision timing pulses. The internal circuit consists of four parts: threshold comparison, trigger comparator, RS flip-flop, 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 resistor capacitor devices externally. Widely used in fields such as toys, signal traffic, and automation control.

## ◆ Product features

- Encapsulation form: SOP-8
- Good timing accuracy
- Strong output driving capability
- Good temperature stability
- The maximum operating frequency can reach over 500kHz
- Compatible with TTL circuits
- The timing can range from microseconds to hours
  (Can be precisely controlled through external resistors and capacitors)

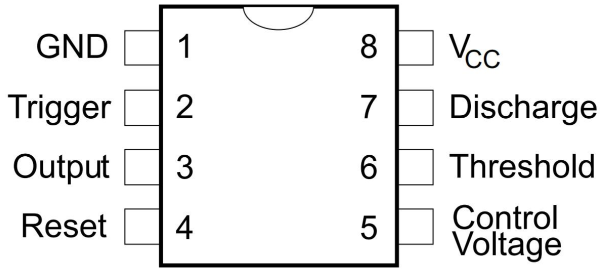
## ◆ Applications

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

## ◆ Product ordering information

| Product Name | Encapsulation | Print Name | Packaging | Packaging Quantity |
|---|---|---|---|---|
| NE555DR | SOP-8 | NE555 | tape | 2500 pieces/plate |

## Package form




## Pin Function Definition

| Pin number | Pin Definition | Pin Function Description |
|---|---|---|
| 1 | GND | Power ground |
| 2 | Trig | Trigger |
| 3 | Output | Output |
| 4 | Reset | Reset |
| 5 | Cont | Control voltage |
| 6 | Thres | Threshold |
| 7 | Disch | Discharge |
| 8 | $V_{CC}$ | Positive power supply |

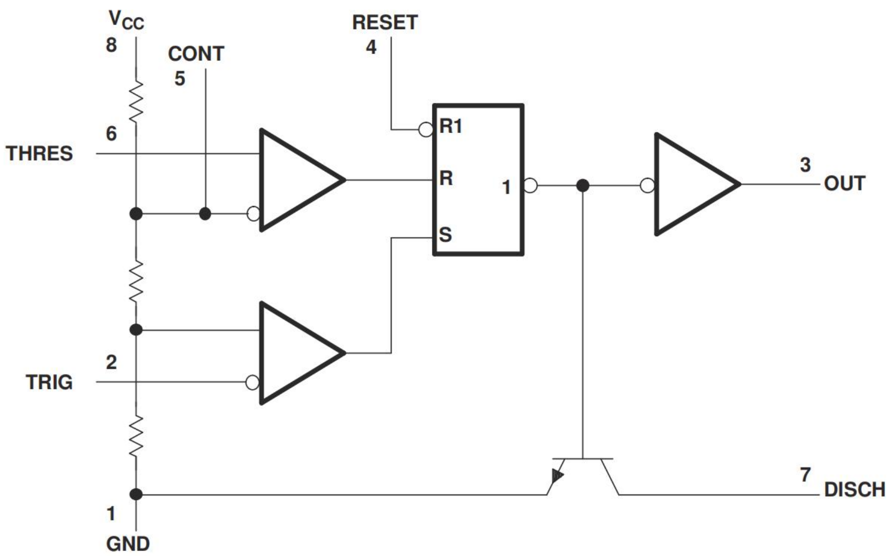
  

## ◆ Limiting parameters

| Parameter | Symbol | limit value | Unit |
|---|---|---|---|
| Power supply voltage | $V_{CC}$ | 18 | V |
| input voltage | $V_I$ (thre,trig,cont,reset) | $V_{CC}$ | V |
| Output Current | $I_O$ | ±220 | mA |
| Dissipated power | $P_D$ | 400 | mW |
| Operating Temperature | $T_A$ | 0~70 | ℃ |
| Storage temperature | $T_S$ | -65~150 | ℃ |
| Welding temperature，10s | $T_W$ | 245 | ℃ |

Note: The limit parameter refers to the limit value that cannot be exceeded under any conditions. If this limit is exceeded, it may cause physical damage such as product degradation; At the same time, it cannot be guaranteed that the chip can work normally when approaching the limit parameters.

## ◆ Block Diagram




## ◆ Recommended electrical parameters

| Project | Symbol | Parameter value | Unit |
|---|---|---|---|
| Power supply voltage | $V_{CC}$ | 4.5~15 | V |
| Maximum input voltage | Vth,Vtrig,Vcont,Vreset | $V_{CC}$ | V |
| Output Current | $I_O$ | ±200 | mA |

## ◆ Electrical characteristics (TA=25 ℃, unless otherwise specified)

| Project | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Operating Voltage | $V_{CC}$ | | 4.5 | - | 15 | V |
| operating current | $I_{CC}$ | $V_{CC}$=5V,$R_L$=∞,$V_O$=$V_{OL}$ | - | 3 | 6 | mA |
| | | $V_{CC}$=5V,$R_L$=∞,$V_O$=$V_{OH}$ | - | 1.5 | 5 | mA |
| | | $V_{CC}$=15V,$R_L$=∞,$V_O$=$V_{OL}$ | - | 8 | 15 | mA |
| | | $V_{CC}$=15V,$R_L$=∞,$V_O$=$V_{OH}$ | - | 6 | 13 | mA |
| Control terminal voltage | $V_{CL}$ | $V_{CC}$=15V | - | 10.0 | 11 | V |
| | | $V_{CC}$=5V | - | 3.3 | 4 | V |
| Threshold voltage terminal voltage | $V_{TH}$ | $V_{CC}$=15V | - | 10.0 | 11.2 | V |
| | | $V_{CC}$=5V | - | 3.3 | 4.2 | V |
| Threshold voltage and current | $I_{TH}$*note1 | $V_{CC}$=15V, $V_{TH}$=0V | - | - | 250 | nA |
| Trigger terminal voltage | $V_{TRIG}$ | $V_{CC}$=15V | - | 5.0 | 5.6 | V |
| | | $V_{CC}$=5V | - | 1.6 | 2.2 | V |
| Trigger terminal current | $I_{TRIG}$ | $V_{CC}$=15V,$V_{TRIG}$=0V | - | - | 2 | μA |
| Reset terminal high voltage | $V_{RESETH}$ | $V_{CC}$=5V | 1.5 | - | VCC | V |
| Low voltage at reset terminal | $V_{RESETL}$ | $V_{CC}$=5V | GND | - | 0.5 | V |
| Reset terminal current | $I_{RESET}$ | $V_{RESET}$=0.4V,$V_{CC}$=15V | - | 0.13 | 0.4 | mA |
| | | $V_{RESET}$=0V,$V_{CC}$=15V | - | 0.3 | 1.5 | VmA |
| Output low voltage | $V_{OL}$ | $V_{CC}$=15V,$I_L$=-5mA | - | 0.02 | 0.25 | V |
| | | $V_{CC}$=15V,$I_L$=-50mA | - | 0.04 | 0.75 | |
| | | $V_{CC}$=15V,$I_L$=-100mA | - | 2.0 | 2.5 | |
| | | $V_{CC}$=15V,$I_L$=-200mA | - | 2.8 | - | |
| | | $V_{CC}$=5V,$I_L$=-5mA | - | 0.08 | 0.35 | |
| | | $V_{CC}$=5V,$I_L$=-8mA | - | 0.15 | 0.4 | |
| Output high voltage | $V_{OH}$ | $V_{CC}$=15V,$I_L$=-100mA | 12.75 | 13.3 | - | V |
| | | $V_{CC}$=15V,$I_L$=-200mA | - | 12.2 | - | |
| | | $V_{CC}$=5V,$I_L$=-100mA | 2.75 | 3.3 | - | |
| Close the leakage current of the discharge tube | $I_{dis}$ (off) | $V_O$=$V_{OH}$,$V_{dis}$=10V | - | - | 100 | nA |
| Discharge tube saturation voltage | $V_{dis}$ (sat) | $V_O$=$V_{OL}$; $V_{CC}$=15V, $I_{ids}$=15mA | - | 140 | 480 | mV |
| | | $V_O$=$V_{OL}$; $V_{CC}$=5V, $I_{ids}$=4.5mA | - | 100 | 200 | |
| Output rising edge time | $t_R$ | $C_L$=15pF | - | 80 | 3000 | ns |
| Output falling edge time | $t_F$ | $C_L$=15pF | - | 50 | 300 | ns |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| timing error (Monostable state) | TS*note2 | $R_A$=2kΩ to100kΩ C=0.1μF | $V_{CC}$=15V, initial error | - | 1 | - | % |
| | Tv | | Drift with power supply voltage (4.5~15V) | - | 0.1 | - | %/V |
| | Tt | | $V_{CC}$=15V, Drift with temperature (0~60℃) | - | 150 | - | ppm℃ |
| timingerror (Nonsteady state) | TS*note2 | $R_A$,$R_B$=1kΩ To 100kΩ C=0.1μF | $V_{CC}$=15V, initial error | - | 1 | - | % |
| | Tv | | Drift with power supply voltage (4.5~15V) | - | 0.1 | - | %/V |
| | Tt | | $V_{CC}$=15V, Drift with temperature (0~60℃) | - | 150 | - | ppm℃ |

Notes:
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. Meanwhile, timing errors are affected by errors in external capacitors and resistors.

## ◆ Typical application routes

Monostable state:

In monostable mode, when the input level reaches 1/3Vcc, the circuit triggers the output high level and maintains t=1.1 * RA * C time before the output becomes low level. Within time t, regardless of the input level, the output state is not affected. The circuit and waveform are shown in Figures 3 and 4.

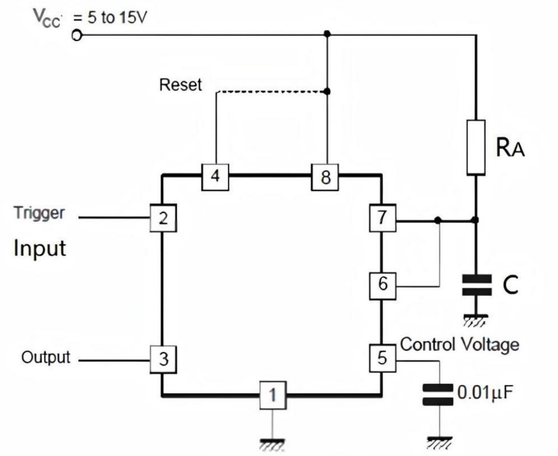



Figure 3 Single Steady State Circuit

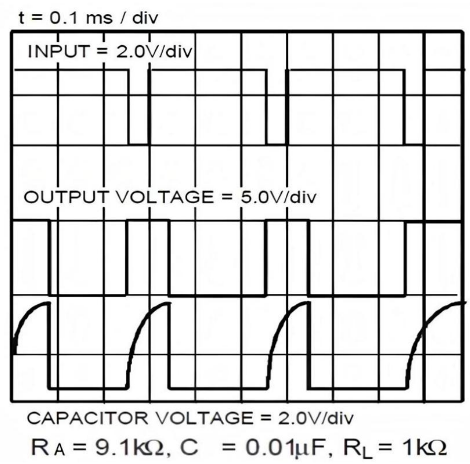



Figure 4 Single Steady State Waveform Diagram

**Unstable state:**

In non steady state mode, the circuit will automatically trigger and output a square wave multi harmonic oscillator. Its output square wave frequency and duty cycle can be adjusted by RA, RB, and C sizes. The triggering mode, charging and discharging time, and frequency are independent of the power supply voltage. The circuit and waveform are shown in Figures 5 and 6.

Output high-level pulse width th=0.693 * (RA+RB) * C;

Low level pulse width tl=0.693 * RB * C;

T=th+t=0.693(RA+2RB)C;

Frequency f=1/T=1.44/(RA * C+2RB * C); Duty cycle D=t/T=RB/(RA+2RB)

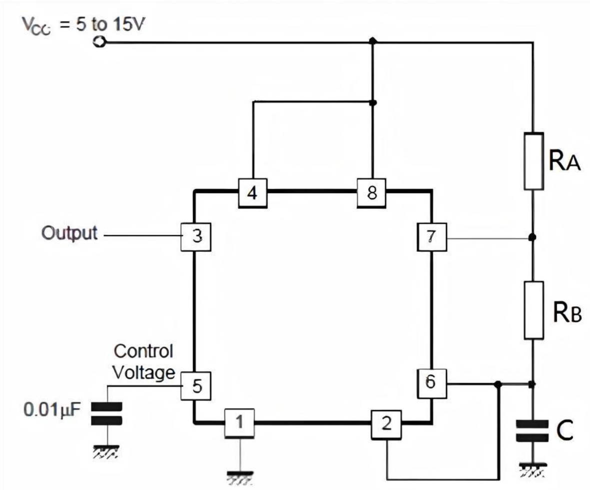



Figure 5, Non steady state Circuit

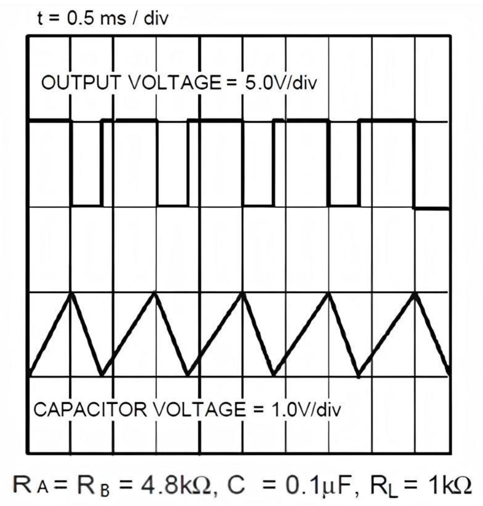



Figure 6, Non steady state waveform diagram

**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. Refer to Figures 7 and 8.

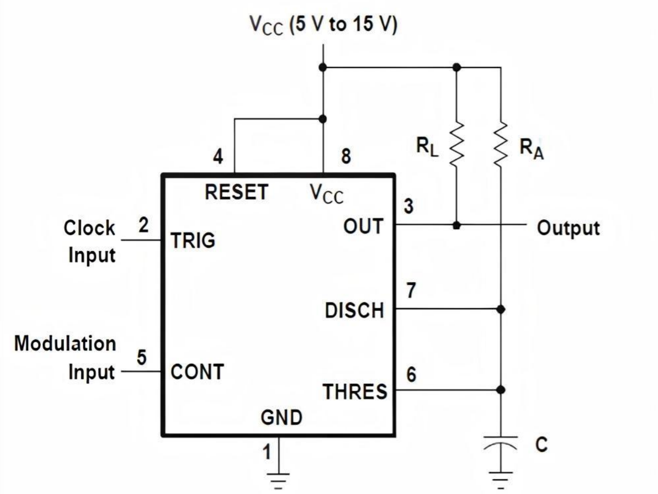



Figure 7, Pulse Width Modulation Circuit

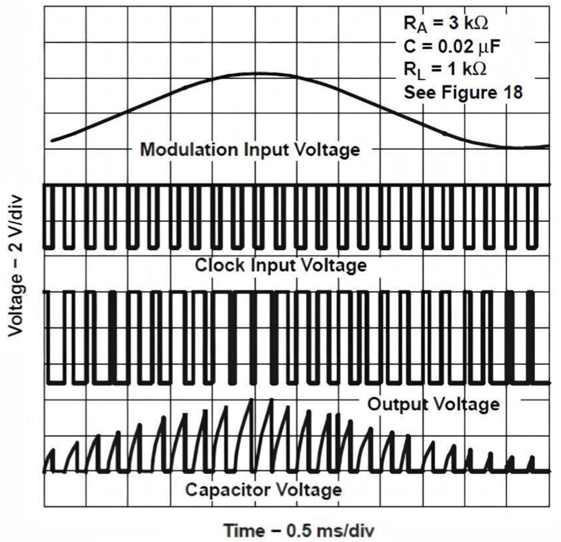



Figure 8, waveform diagram of pulse width modulation circuit

**Pulse position modulation:**

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

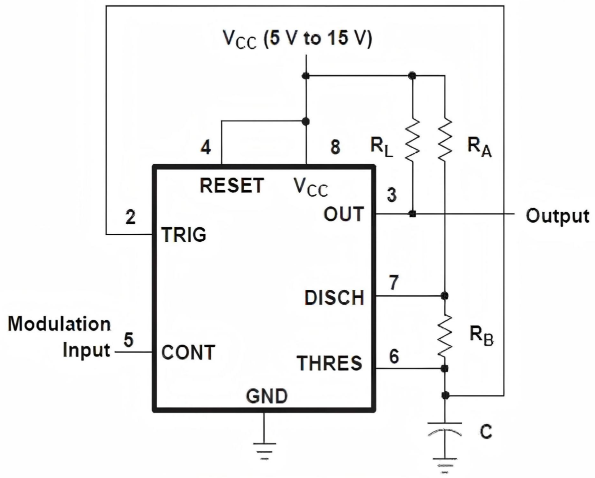



Figure 9, Pulse Width Position Modulation Circuit

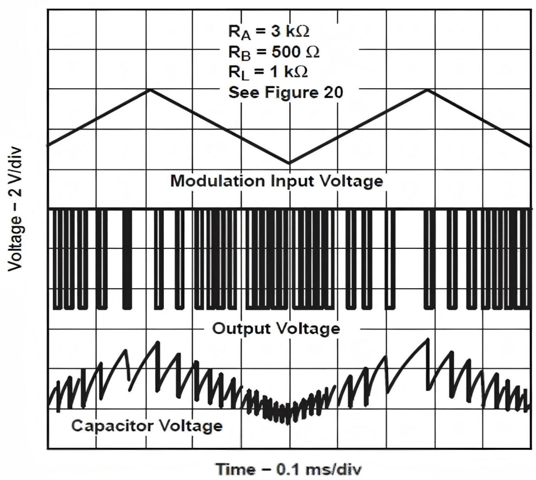
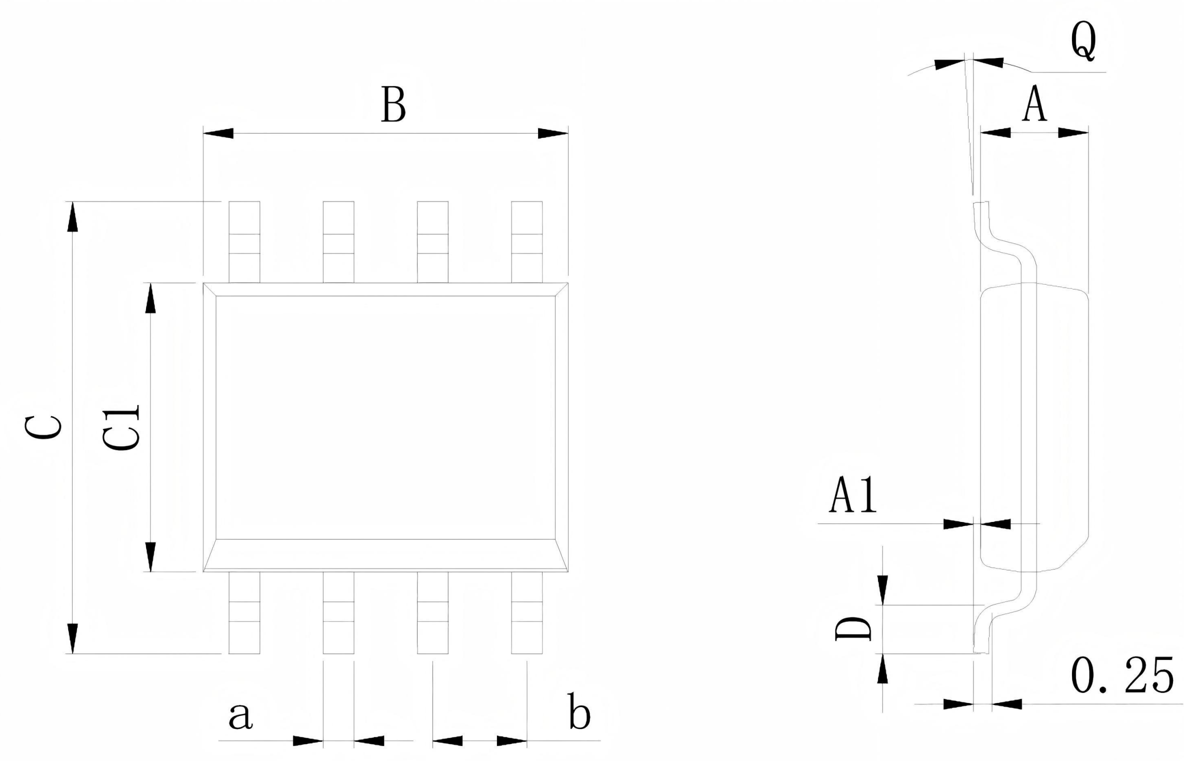



Figure 10, waveform diagram of pulse width position modulation circuit

## ◆ Package size diagram

**SOP8(150mil)**




| Dimensions In Millimeters(SOP-8) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Symnol:** | **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 | |

## ◆ Attention

- AOTE implements dynamic technical updates. Specifications are subject to change. Refer to the official website for the latest version.
- Users must strictly adhere to specified conditions. Failures caused by misuse (overload, high temperature, incompatible circuits) are excluded from warranty.
- Contact technical support for customized validation in critical applications (medical devices, industrial control).
- This document is valid until December 31, 2026. Updates will be notified on the official website.
- For further clarification on technical specifications or application solutions, please contact us through official channels: