

## TIMER

## ■ GENERAL DESCRIPTION

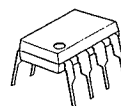
The NJM555 monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. In the time delay mode, delay time is precisely controlled by only two external parts: a resistor and a capacitor. For operation as an oscillator, both the free running frequency and the duty cycle are accurately controlled by two external resistors and a capacitor.

Terminals are provided for triggering and resetting. The circuit will trigger and reset on falling waveforms. The output can source or sink up to 200mA or drive TTL circuits.

## ■ FEATURES

- Operating Voltage (4.5V ~ 16V)
- Less Number of External Components
- Package Outline DIP8, DMP8, SSOP8, SIP8
- Bipolar Technology

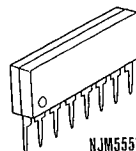
## ■ PACKAGE OUTLINE



NJM555D



NJM555M

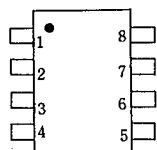
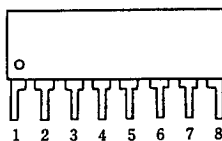


NJM555L



NJM555V

## ■ PIN CONFIGURATION

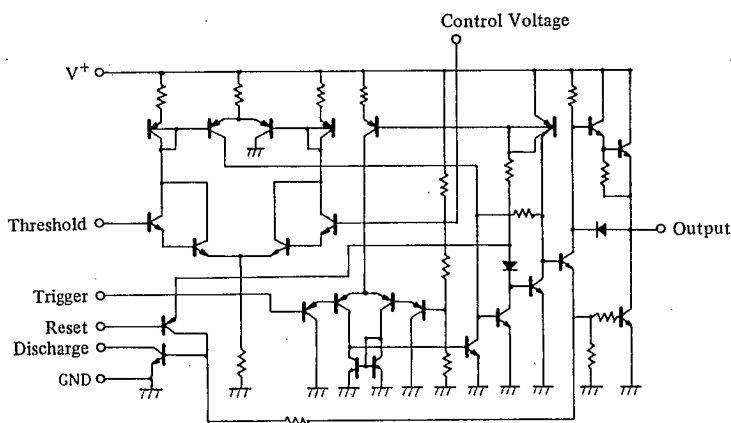
NJM555D  
NJM555M  
NJM555V

NJM555L

## PIN FUNCTION

1. GND
2. Trigger
3. Output
4. Reset
5. Control Voltage
6. Threshold
7. Discharge
8. V<sup>+</sup>

## ■ EQUIVALENT CIRCUIT



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER                   | SYMBOL           | RATINGS     | UNIT |
|-----------------------------|------------------|-------------|------|
| Supply Voltage              | V <sup>+</sup>   | 18          | V    |
| Power Dissipation           | P <sub>D</sub>   | (DIP8) 500  | mW   |
|                             |                  | (DMP8) 300  | mW   |
|                             |                  | (SSOP8) 250 | mW   |
|                             |                  | (SIP8) 800  | mW   |
| Operating Temperature Range | T <sub>opr</sub> | -40 ~ +85   | °C   |
| Storage Temperature Range   | T <sub>stg</sub> | -40 ~ +125  | °C   |

## ■ ELECTRICAL CHARACTERISTICS

(V<sup>+</sup>=5~15V, Ta=25°C)

| PARAMETER                  | SYMBOL          | TEST CONDITION                                          | MIN.  | TYP. | MAX. | UNIT            |
|----------------------------|-----------------|---------------------------------------------------------|-------|------|------|-----------------|
| Operating Voltage          | V <sup>+</sup>  |                                                         | 4.5   | —    | 16   | V               |
| Operating Current (Note 1) | I <sub>CC</sub> | V <sup>+</sup> =5V, R <sub>L</sub> =∞                   | —     | 3.0  | 6.0  | mA              |
| Operating Current (Note 1) | I <sub>CC</sub> | V <sup>+</sup> =15V, R <sub>L</sub> =∞                  | —     | 10   | 15   | mA              |
| Timing Error (Note 2)      |                 |                                                         |       |      |      |                 |
| Initial Accuracy           | E <sub>t</sub>  | Ta=-20~75°C, V <sup>+</sup> =5~15V                      | —     | 1.0  | —    | %               |
| Drift with Temperature     | E <sub>t</sub>  | Ta=-20~75°C, V <sup>+</sup> =5~15V                      | —     | 50   | —    | ppm/°C          |
| Drift with Supply Voltage  | E <sub>t</sub>  | Ta=-20~75°C, V <sup>+</sup> =5~15V                      | —     | 0.1  | —    | %/V             |
| Threshold Voltage          | V <sub>th</sub> |                                                         | —     | 2/3  | —    | ×V <sup>+</sup> |
| Trigger Voltage            | V <sub>T</sub>  | V <sup>+</sup> =15V                                     | —     | 5.0  | —    | V               |
| Trigger Voltage            | V <sub>T</sub>  | V <sup>+</sup> =5V                                      | —     | 1.67 | —    | V               |
| Trigger Current            | I <sub>T</sub>  |                                                         | —     | 0.5  | —    | μA              |
| Reset Voltage              | V <sub>R</sub>  |                                                         | 0.4   | 0.5  | 1.0  | V               |
| Reset Current              | I <sub>R</sub>  |                                                         | —     | 0.1  | —    | mA              |
| Threshold Current          | I <sub>th</sub> |                                                         | —     | 0.1  | 0.25 | μA              |
| Control Voltage Level      | V <sub>CL</sub> | V <sup>+</sup> =15V                                     | 9     | 10   | 11   | V               |
| Control Voltage Level      | V <sub>CL</sub> | V <sup>+</sup> =5V                                      | 2.6   | 3.33 | 4.0  | V               |
| Output Voltage (Low)       | V <sub>OL</sub> | V <sup>+</sup> =15V I <sub>sink</sub> =10mA             | —     | 0.1  | 0.25 | V               |
| Output Voltage (Low)       | V <sub>OL</sub> | V <sup>+</sup> =15V I <sub>sink</sub> =50mA             | —     | 0.4  | 0.75 | V               |
| Output Voltage (Low)       | V <sub>OL</sub> | V <sup>+</sup> =15V I <sub>sink</sub> =100mA (Note 3)   | —     | 2.0  | 2.5  | V               |
| Output Voltage (Low)       | V <sub>OL</sub> | V <sup>+</sup> =15V I <sub>sink</sub> =200mA (Note 3)   | —     | 2.5  | —    | V               |
| Output Voltage (Low)       | V <sub>OL</sub> | V <sup>+</sup> =5V I <sub>sink</sub> =5mA               | —     | 0.25 | 0.35 | V               |
| Output Voltage (High)      | V <sub>OH</sub> | V <sup>+</sup> =15V I <sub>source</sub> =200mA (Note 3) | —     | 12.5 | —    | V               |
| Output Voltage (High)      | V <sub>OH</sub> | V <sup>+</sup> =15V I <sub>source</sub> =100mA (Note 3) | 12.75 | 13.3 | —    | V               |
| Output Voltage (High)      | V <sub>OH</sub> | V <sup>+</sup> =15V I <sub>source</sub> =40mA           | —     | 13.5 | —    | V               |
| Output Voltage (High)      | V <sub>OH</sub> | V <sup>+</sup> =5V I <sub>source</sub> =100mA           | 2.75  | 3.3  | —    | V               |
| Rise Time of Output        | t <sub>r</sub>  | No Loading                                              | —     | 100  | —    | ns              |
| Fall Time of Output        | t <sub>f</sub>  | No Loading                                              | —     | 100  | —    | ns              |

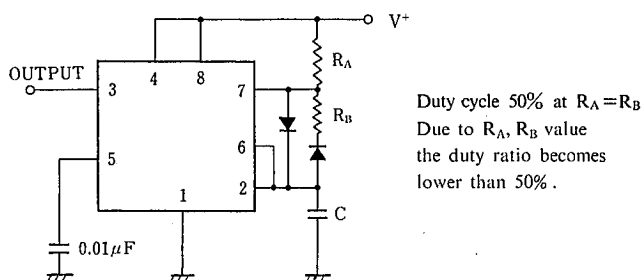
Note 1: Low output condition (When the output is high, it is lower than the low output condition by 1mA in the standard specification.)

Note 2: R<sub>A</sub>, R<sub>B</sub>=1k~100kΩ, C=0.1μF, V<sup>+</sup>=15V from 5V

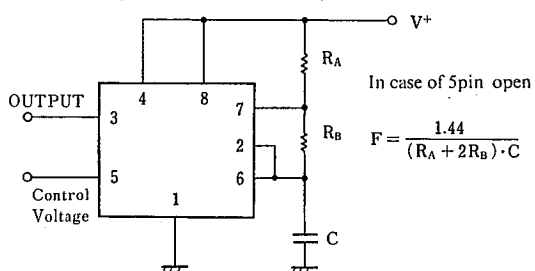
Note 3: Not specified for NJM555M/NJM555E

## ■ TYPICAL APPLICATION

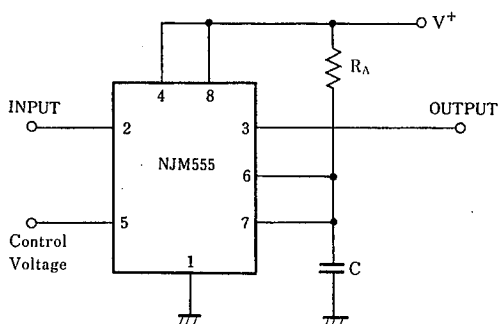
### (1) 50% Duty Cycle Oscillator



### (2) Oscillation frequency can be changed by changing the control voltage.



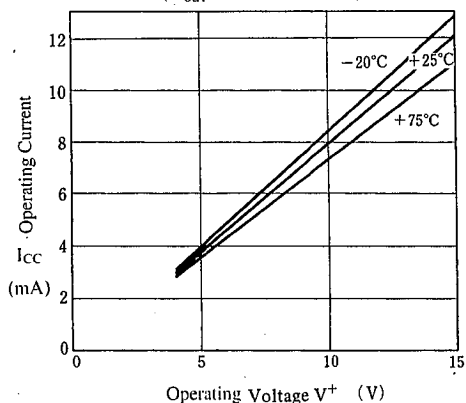
### (3) Pulse Width Modulation



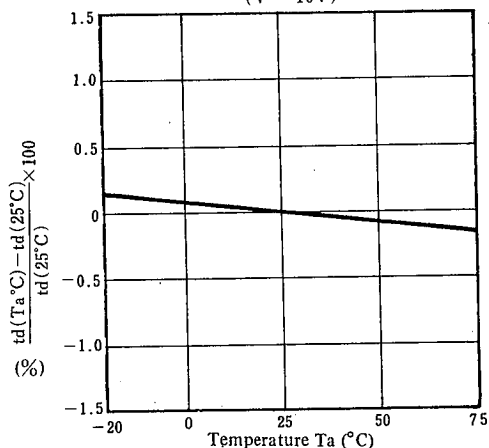
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## TYPICAL CHARACTERISTICS

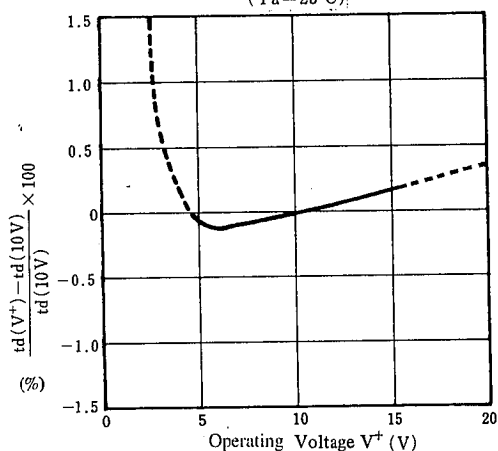
**Operating Current vs. Operating Voltage**  
( $V_{out} = \text{LOW STATE}$ )



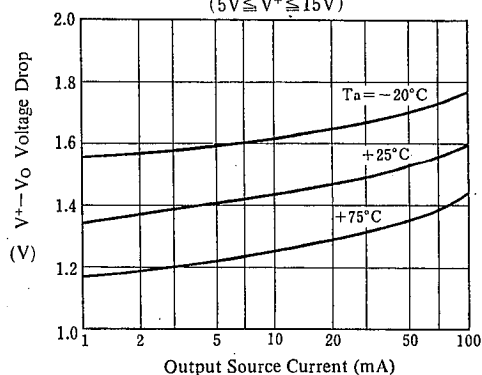
**Delay Time vs. Temperature**  
( $V^+ = 10V$ )



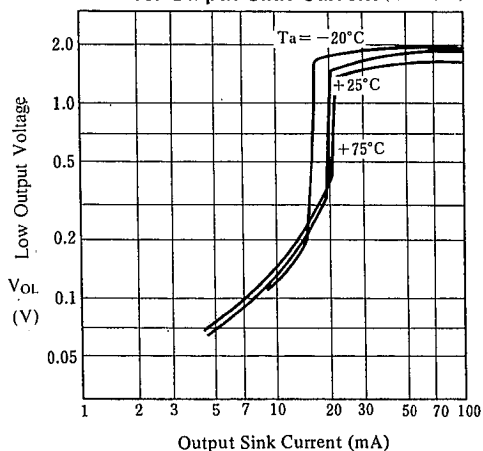
**Delay Time vs. Operating Voltage**  
( $T_a = 25^\circ\text{C}$ )



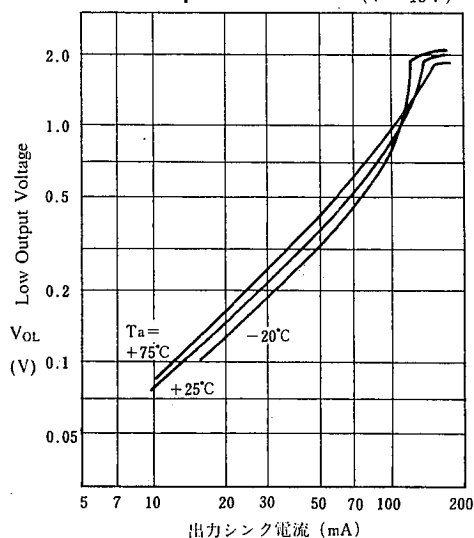
**High Output Voltage Drop vs. Output Source Current**  
( $5V \leq V^+ \leq 15V$ )



**Low Output Voltage vs. Output Sink Current** ( $V^+ = 5V$ )



**Low Output Voltage vs. Output Sink Current** ( $V^+ = 15V$ )



## ■ TYPICAL CHARACTERISTICS

### 1. Monostable Operation

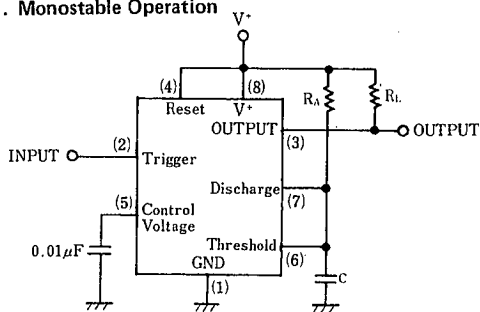


Fig. 1

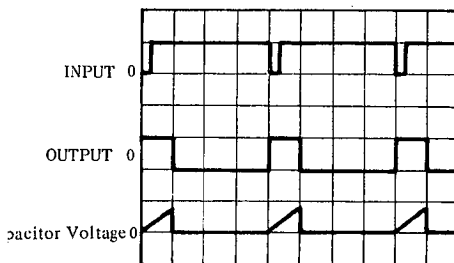
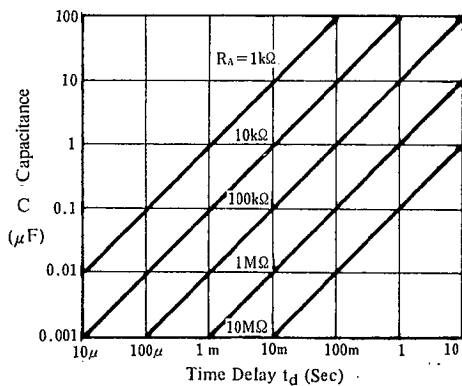


Fig.2 Wave Form



Time Delay vs.  $R_A$ ,  $R_B$  and  $C$

Fig. 2 shows a typical example of the monostable operation.  $T_H = 1.1R_A \cdot C$  assuming that  $T_H$  be the time at the high output level in this figure.

### 2. Free Running Operation

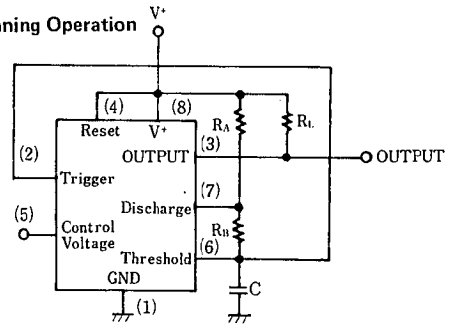


Fig. 3

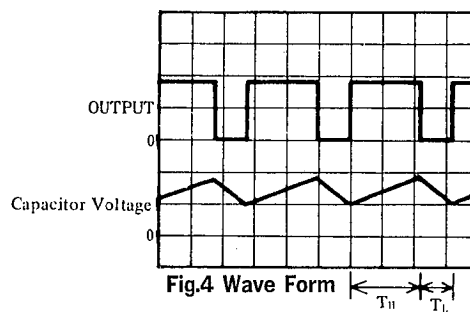
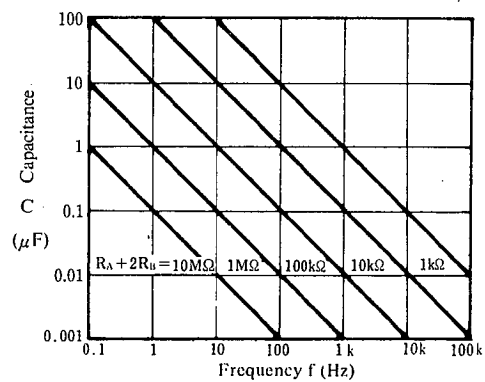


Fig.4 Wave Form



Free Running Frequency vs.  $R_A$ ,  $R_B$  and  $C$

Fig. 4 shows a typical example of the free running operation.

The charge time (output High) is given by:

$$T_H = 0.693 (R_A + R_B) \cdot C$$

And the discharge time (output Low) by:

$$T_L = 0.693 R_B \cdot C$$

The frequency of oscillation is:

$$F = \frac{1.44}{(R_A + 2R_B) \cdot C}$$

The duty cycle is:

$$D = \frac{T_H}{T_H + T_L} = \frac{R_A + R_B}{R_A + 2R_B}$$

## MEMO

**[CAUTION]**

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Электрон  
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