

TIMER

■ GENERAL DESCRIPTION

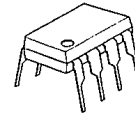
The NJM555 monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. In the time delay mode, delay time is precisely controlled by only two external parts: a resistor and a capacitor. For operation as an oscillator, both the free running frequency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

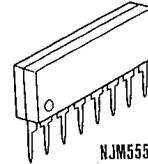
■ PACKAGE OUTLINE



NJM555D



NJM555M

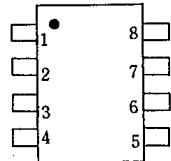


NJM555L

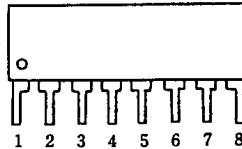


NJM555V

■ PIN CONFIGURATION



NJM555D
NJM555M
NJM555V

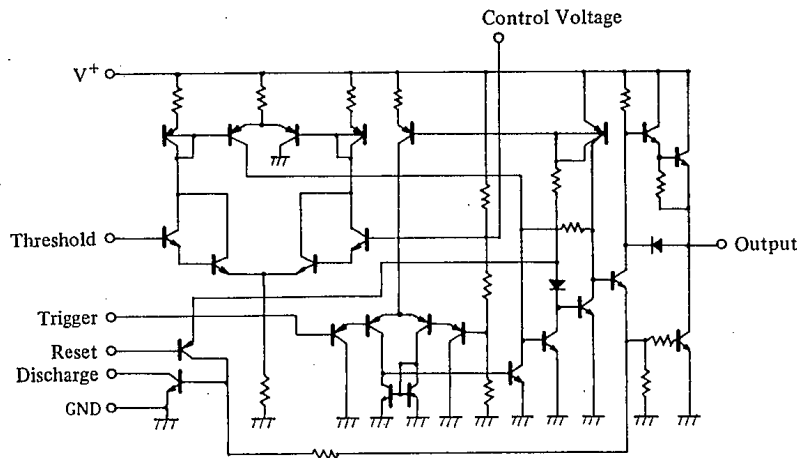


NJM555L

PIN FUNCTION

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

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-----------------------------|------------------|-------------|------|
| Supply Voltage | V ⁺ | 18 | V |
| Power Dissipation | P _D | (DIP8) 500 | mW |
| | | (DMP8) 300 | mW |
| | | (SSOP8) 250 | mW |
| | | (SIP8) 800 | mW |
| Operating Temperature Range | T _{opr} | -40 ~ +85 | °C |
| Storage Temperature Range | T _{stg} | -40 ~ +125 | °C |

■ ELECTRICAL CHARACTERISTICS

(V⁺=5~15V, Ta=25°C)

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

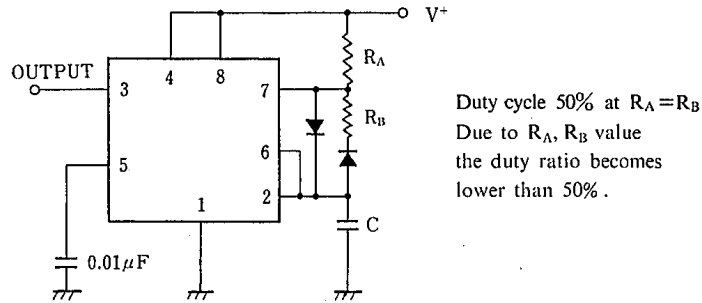
Note 1: Low output condition (When the output is high, it is lower than the low output condition by 1mA in the standard specification.)

Note 2: R_A, R_B=1k~100kΩ, C=0.1μF, V⁺=15V from 5V

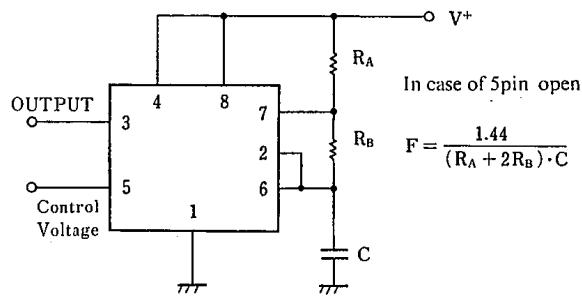
Note 3: Not specified for NJM555M/NJM555E

■ TYPICAL APPLICATION

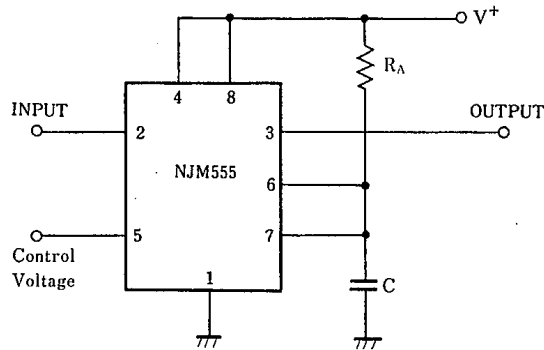
(1) 50% Duty Cycle Oscillator



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



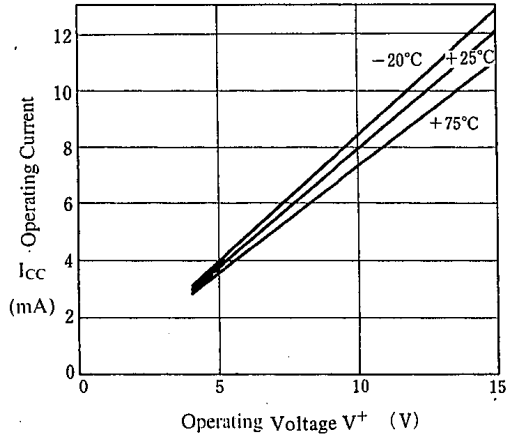
(3) Pulse Width Modulation



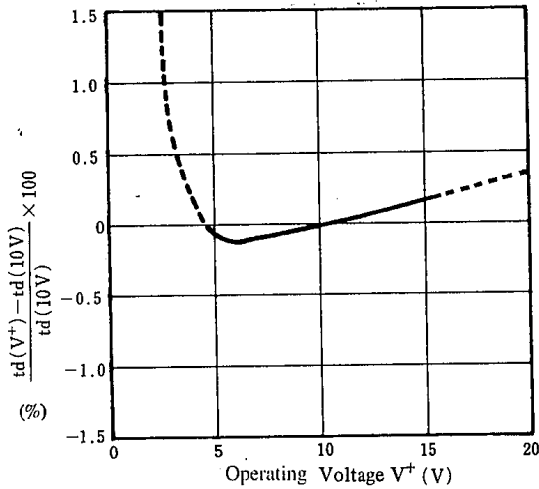
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TYPICAL CHARACTERISTICS

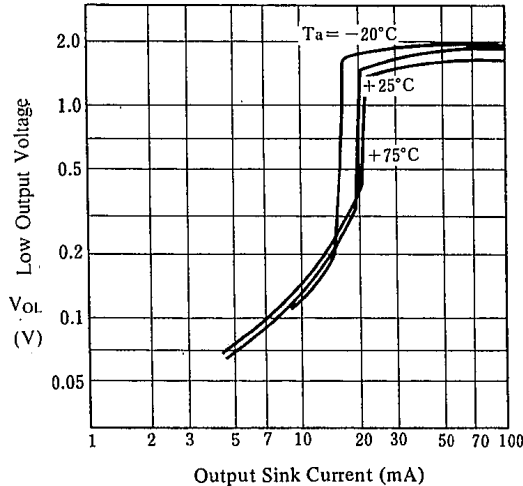
Operating Current vs. Operating Voltage
($V_{OUT} = \text{LOW STATE}$)



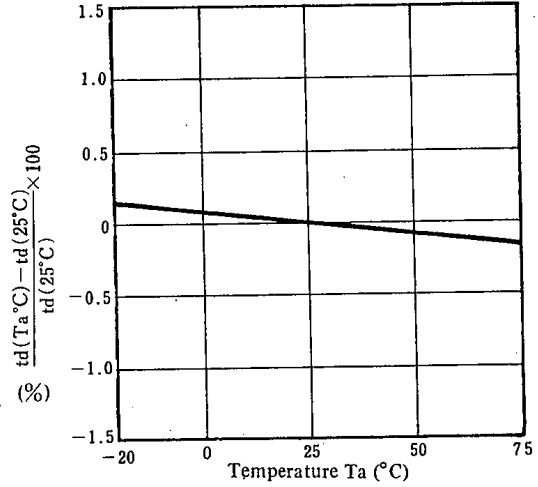
Delay Time vs. Operating Voltage
($T_a = 25^\circ\text{C}$)



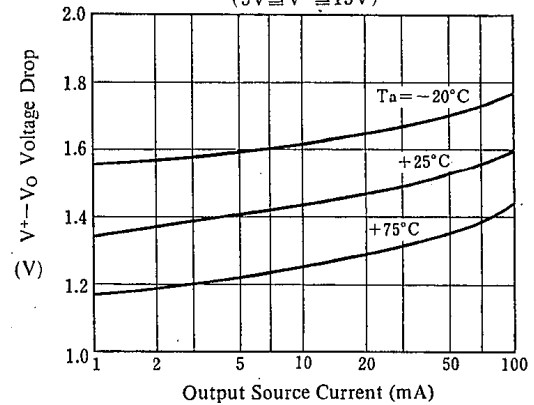
Low Output Voltage vs. Output Sink Current ($V^+ = 5\text{V}$)



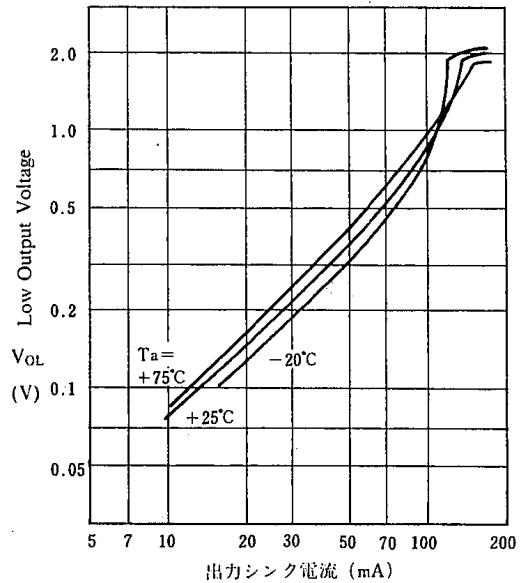
Delay Time vs. Temperature
($V^+ = 10\text{V}$)



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



Low Output Voltage vs. Output Sink Current ($V^+ = 15\text{V}$)



■ TYPICAL CHARACTERISTICS

1. Monostable Operation

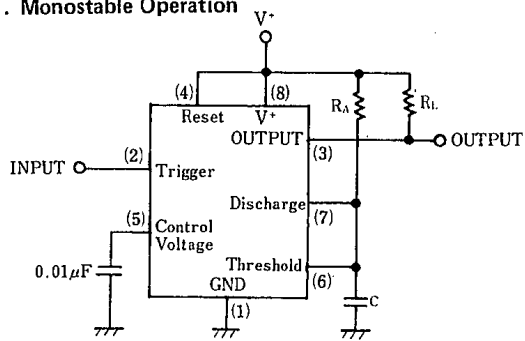


Fig. 1

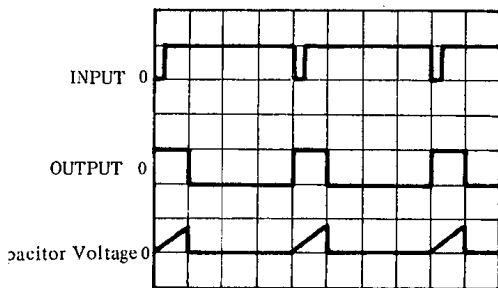
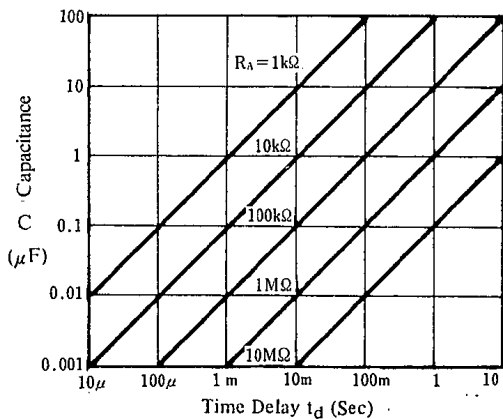


Fig.2 Wave Form



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

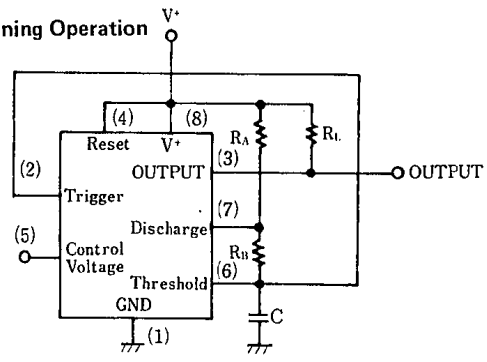


Fig. 3

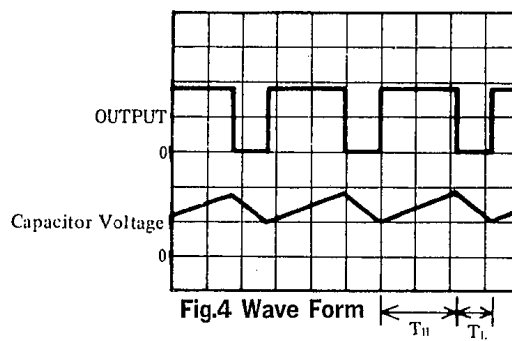
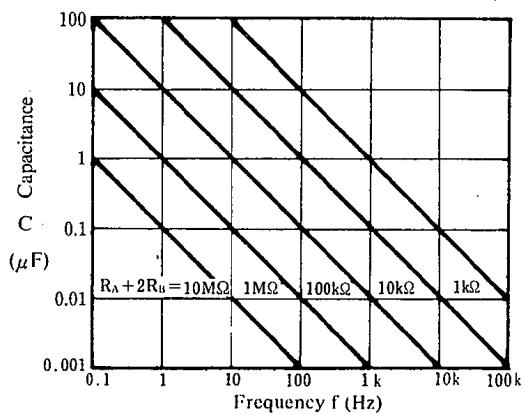


Fig.4 Wave Form



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:

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

NJM555

MEMO

[CAUTION]

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