

TIMER

■ GENERAL DESCRIPTION

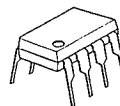
The NJM555 monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. In the time delay mode, delay time is precisely controlled by only two external parts: a resistor and a capacitor. For operation as an oscillator, both the free running frequency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

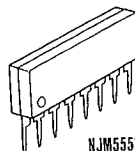
■ PACKAGE OUTLINE



NJM555D



NJM555M

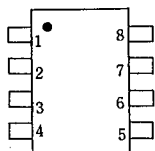


NJM555L

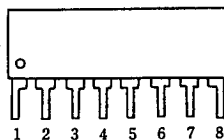


NJM555V

■ PIN CONFIGURATION



NJM555D
NJM555M
NJM555V

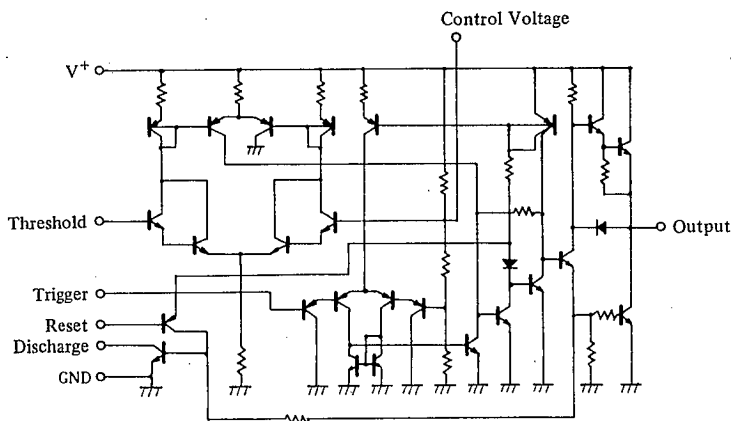


NJM555L

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	—	×V ⁺
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 I _{sink} =10mA	—	0.1	0.25	V
Output Voltage (Low)	V _{OL}	V ⁺ =15V I _{sink} =50mA	—	0.4	0.75	V
Output Voltage (Low)	V _{OL}	V ⁺ =15V I _{sink} =100mA (Note 3)	—	2.0	2.5	V
Output Voltage (Low)	V _{OL}	V ⁺ =15V I _{sink} =200mA (Note 3)	—	2.5	—	V
Output Voltage (Low)	V _{OL}	V ⁺ =5V I _{sink} =5mA	—	0.25	0.35	V
Output Voltage (High)	V _{OHI}	V ⁺ =15V I _{source} =200mA (Note 3)	—	12.5	—	V
Output Voltage (High)	V _{OHI}	V ⁺ =15V I _{source} =100mA (Note 3)	12.75	13.3	—	V
Output Voltage (High)	V _{OHI}	V ⁺ =15V I _{source} =40mA	—	13.5	—	V
Output Voltage (High)	V _{OHI}	V ⁺ =5V I _{source} =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

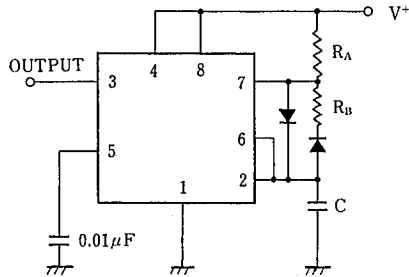
Note 1: Low output condition (When the output is high, it is lower than the low output condition by 1mA in the standard specification.)

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

Note 3: Not specified for NJM555M/NJM555E

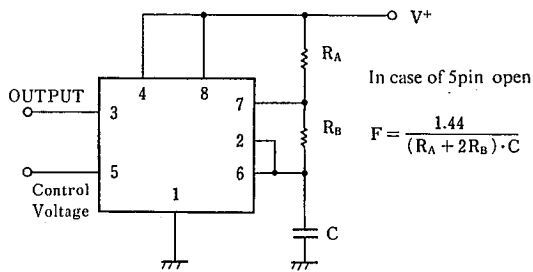
■ TYPICAL APPLICATION

(1) 50% Duty Cycle Oscillator



Duty cycle 50% at $R_A = R_B$
 Due to R_A, R_B value
 the duty ratio becomes
 lower than 50%.

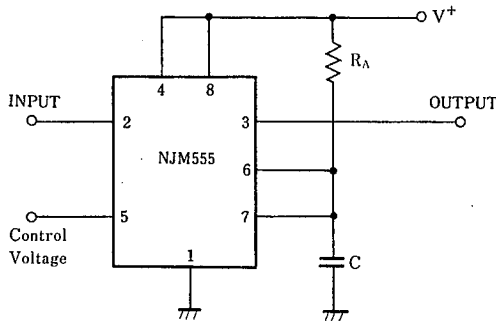
(2) Oscillation frequency can be changed by changing the control voltage.



In case of 5pin open

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

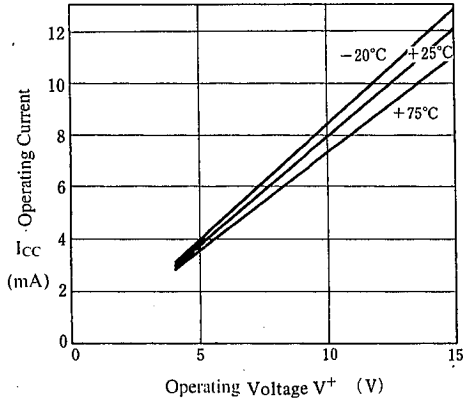
(3) Pulse Width Modulation



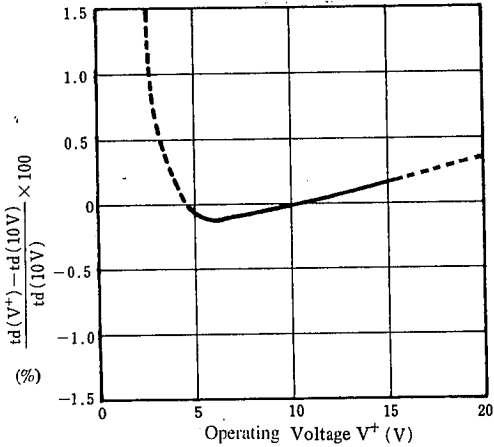
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■ TYPICAL CHARACTERISTICS

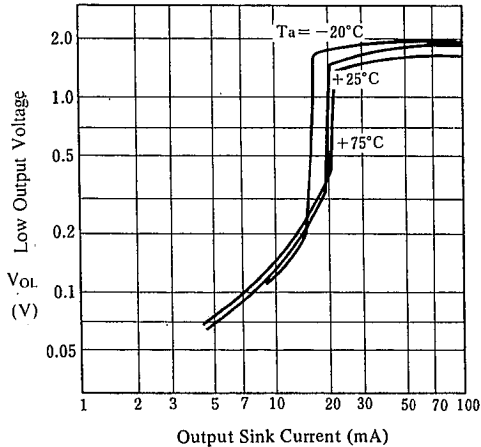
Operating Current vs. Operating Voltage
($V_{out} = \text{LOW STATE}$)



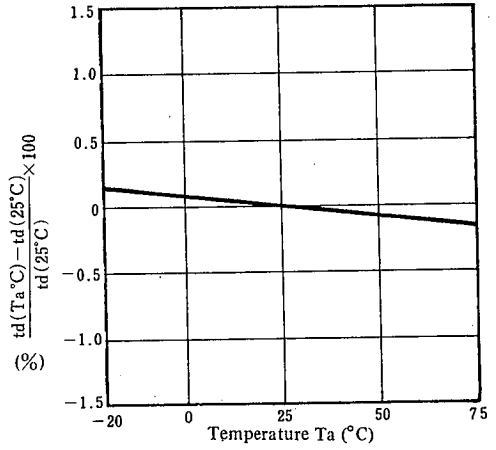
Delay Time vs. Operating Voltage
($T_a = 25^\circ\text{C}$)



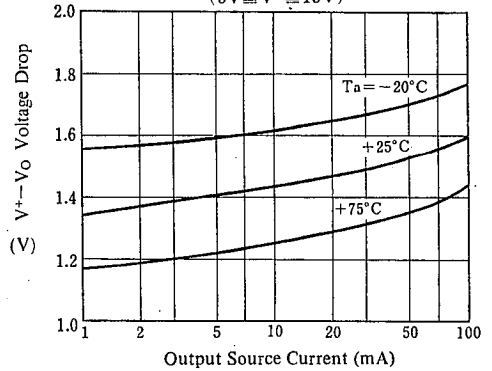
Low Output Voltage vs. Output Sink Current ($V^+ = 5\text{V}$)



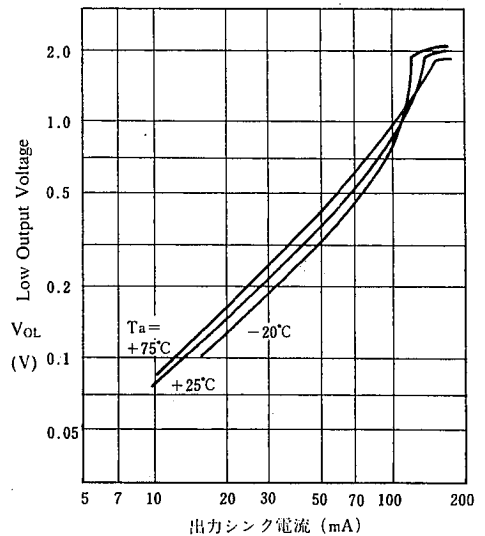
Delay Time vs. Temperature
($V^+ = 10\text{V}$)



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



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



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■ TYPICAL CHARACTERISTICS

1. Monostable Operation

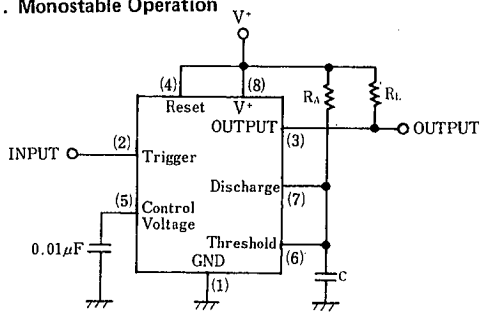


Fig. 1

2. Free Running Operation

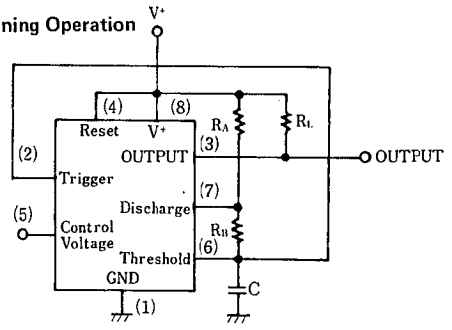


Fig. 3

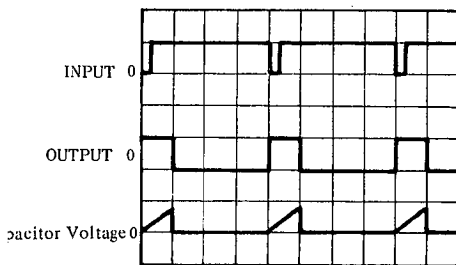


Fig.2 Wave Form

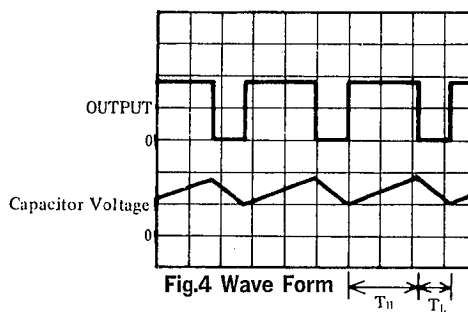
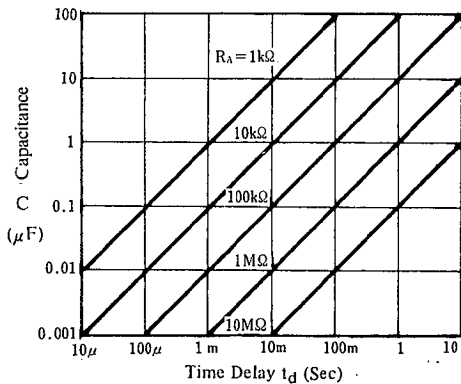
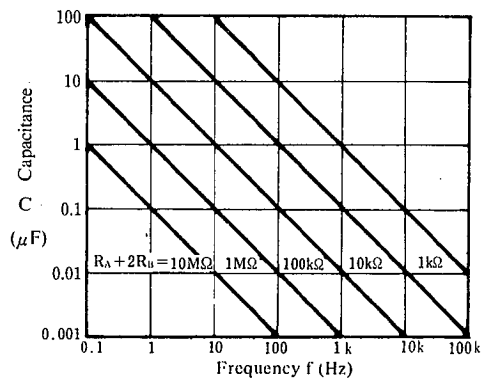


Fig.4 Wave Form



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.



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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