

TIMER

■ GENERAL DESCRIPTION

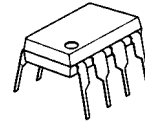
The **NJM555** monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. In the time delay mode, delay time is precisely controlled by only two external parts : a resistor and a capacitor. For operation as an oscillator, both the free running frequency 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 to 16V)
- Less Number of External Components
- Package Outline DIP8, DMP8, SSOP8, SIP8
- Bipolar Technology

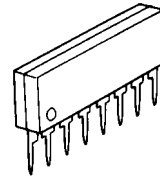
■ PACKAGE OUTLINE



NJM555D



NJM555M

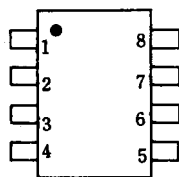


NJM555L

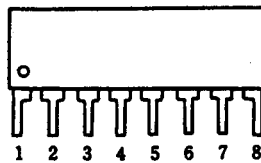


NJM555V

■ PIN CONFIGURATION



NJM555D
NJM555M
NJM555V

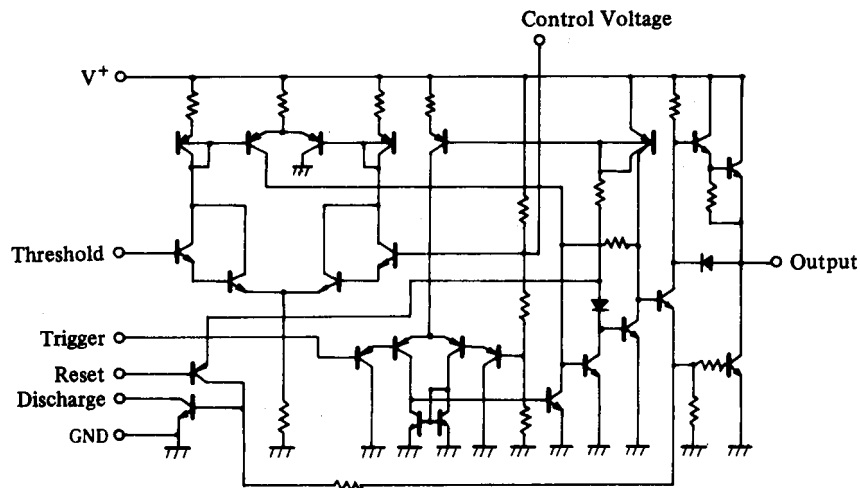


NJM555L

PIN FUNCTION

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

■ EQUIVALENT CIRCUIT



NJM555

■ ABSOLUTE MAXIMUM RATINGS

($T_a=25^{\circ}\text{C}$)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V+	18	V
Power Dissipation	P _D	(DIP8) 1000(Note1)	mW
		(DMP8) 580(Note1)	mW
		(SSOP8) 480(Note1)	mW
		(SIP8) 1600(Note1)	mW
Operating Temperature Range	T _{opr}	-40 to +85	°C
Storage Temperature Range	T _{stg}	-40 to +125	°C

Note1: Mounted on the EIA/JEDEC standard board (76.2×114.3×1.6mm, four layer, FR-4).

■ ELECTRICAL CHARACTERISTICS

($V^+=5$ to 15V, $T_a=25^{\circ}\text{C}$)

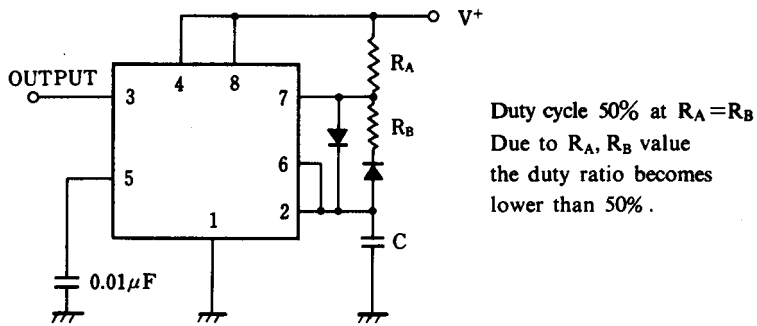
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V ⁺		4.5	-	16	V
Operating Current	I _{CC}	V ⁺ =5V, R _L =∞(Note 2)	-	3.0	6.0	mA
Operating Current	I _{CC}	V ⁺ =15V, R _L =∞(Note 2)	-	10	15	mA
Timing Error						
Initial Accuracy	E _t	T _a =-20 to 75°C, V ⁺ =5 to 15V(Note 3)	-	1.0	-	%
Drift with Temperature	E _t	T _a =-20 to 75°C, V ⁺ =5 to 15V(Note 3)	-	50	-	ppm / °C
Drift with Supply Voltage	E _t	T _a =-20 to 75°C, V ⁺ =5 to 15V(Note 3)	-	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 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	-	2.0	2.5	V
Output Voltage (Low)	V _{OL}	V ⁺ =15V I _{sink} =200mA	-	2.5	-	V
Output Voltage (Low)	V _{OL}	V ⁺ =5V I _{sink} =5mA	-	0.25	0.35	V
Output Voltage (High)	V _{OH}	V ⁺ =15V I _{source} =200mA	-	12.5	-	V
Output Voltage (High)	V _{OH}	V ⁺ =15V I _{source} =100mA	12.75	13.3	-	V
Output Voltage (High)	V _{OH}	V ⁺ =15V I _{source} =40mA	-	13.5	-	V
Output Voltage (High)	V _{OH}	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 2 : Low output condition (When the output is high, it is lower than the low output condition by 1mA in the standard specificatio.)

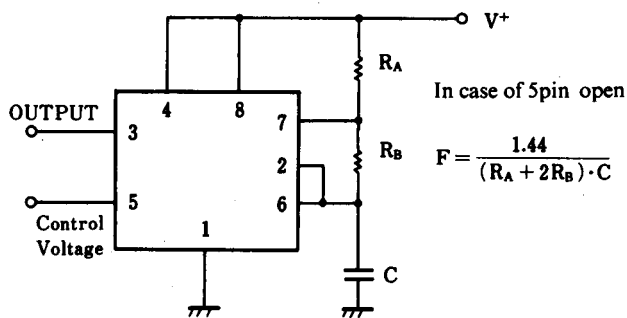
Note 3 : R_A, R_B=1k to 100kΩ, C=0.1μF, V⁺=15V from 5V

■ TYPICAL APPLICATION

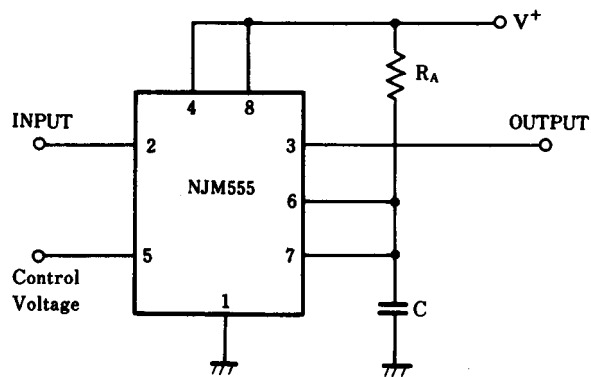
(1) 50% Duty Cycle Oscillator



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

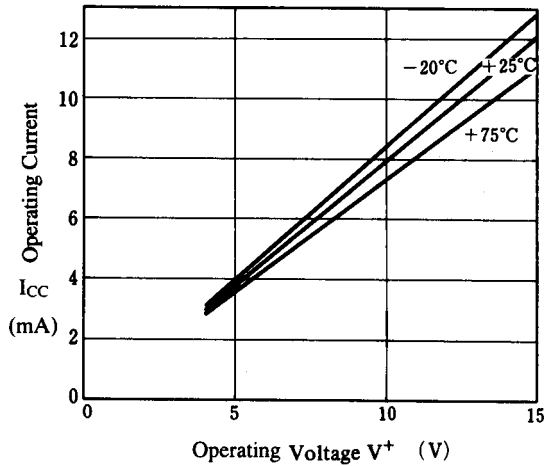


(3) Pulse Width Modulation

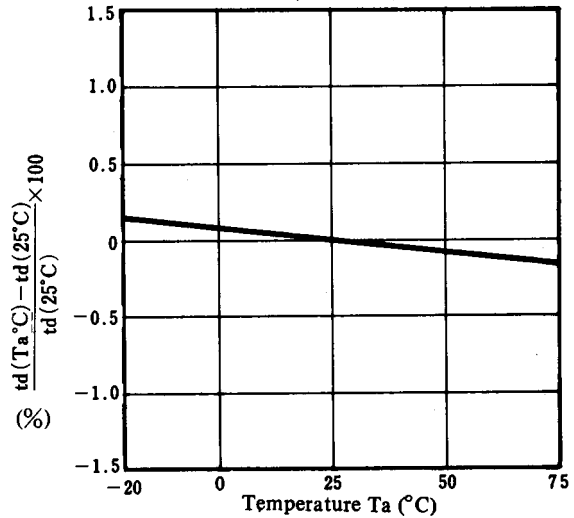


■ TYPICAL CHARACTERISTICS

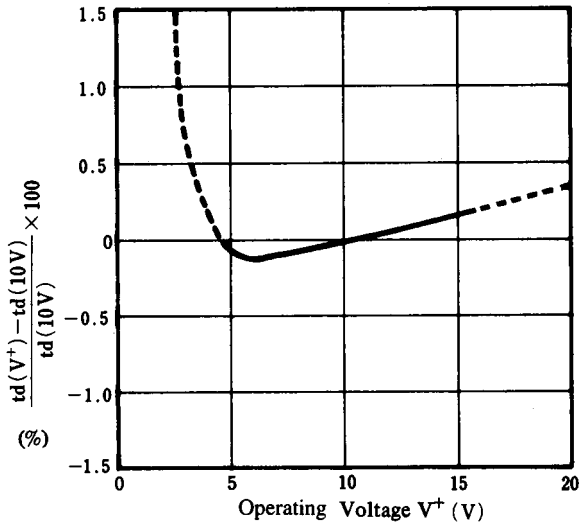
Operating Current vs. Operating Voltage
($V_{out} = \text{LOW STATE}$)



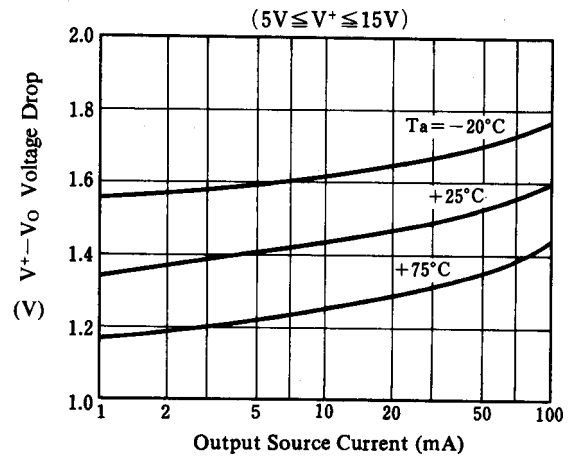
Delay Time vs. Temperature
($V^+ = 10V$)



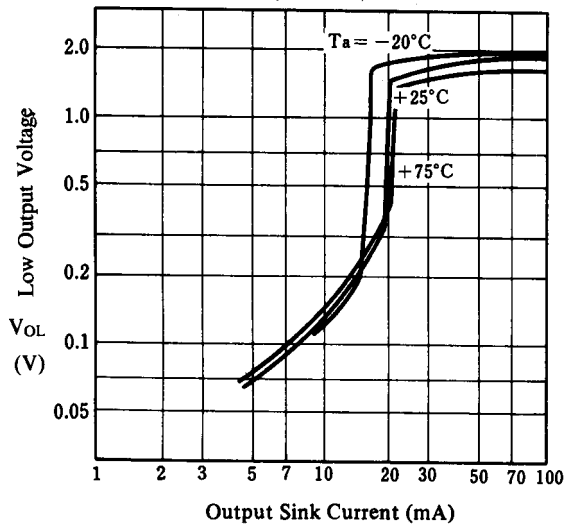
Delay Time vs. Operating Voltage
($T_a = 25^\circ\text{C}$)



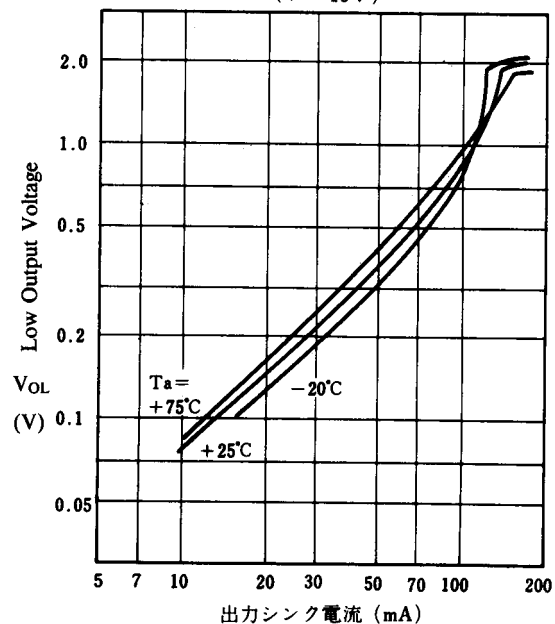
High Output Voltage Drop vs. Output Source Current
($5V \leq V^+ \leq 15V$)



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



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



■ TYPICAL CHARACTERISTICS

1. Monostable Operation

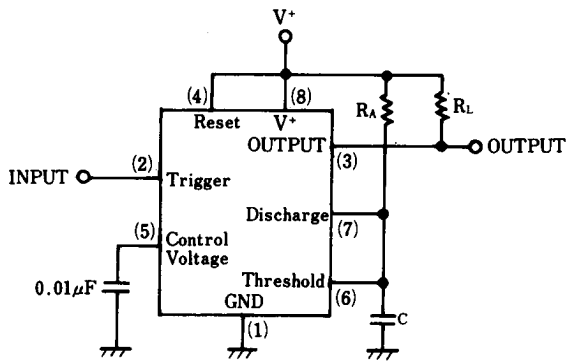


Fig. 1

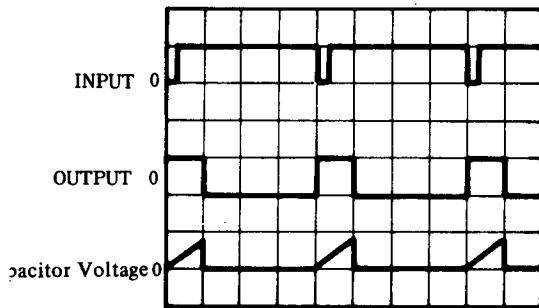
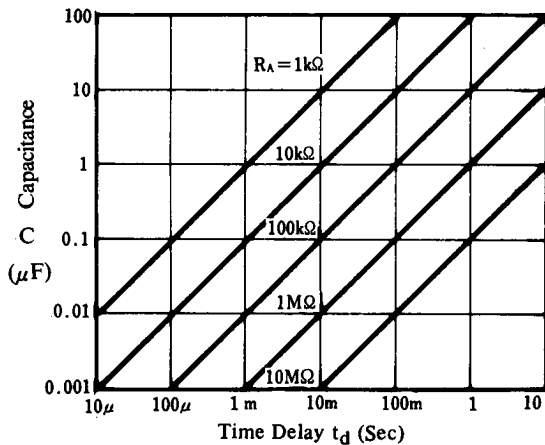


Fig.2 Wave Form



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

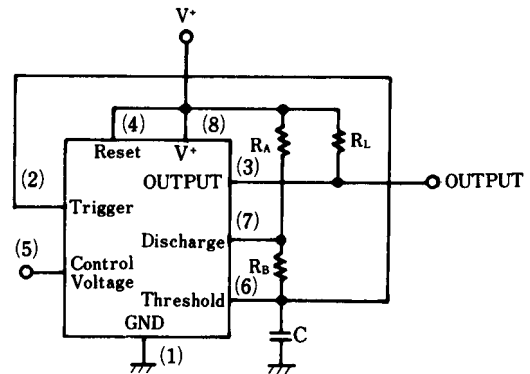


Fig. 3

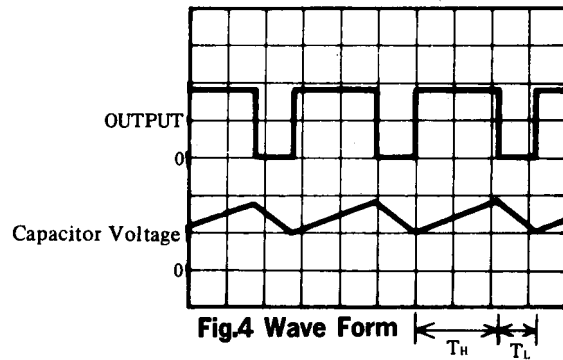
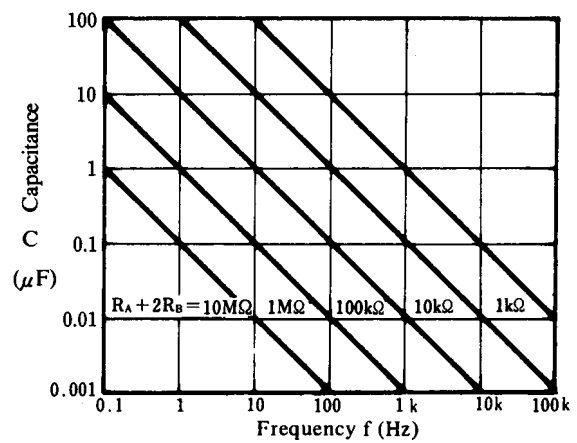


Fig.4 Wave Form



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:

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

[CAUTION]

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