

TIMER

■ GENERAL DESCRIPTION

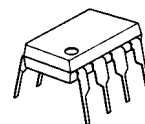
The **NJM555** monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. In the time delay mode, delay time is precisely controlled by only two external parts : a resistor and a capacitor. For operation as an oscillator, both the free running frequency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

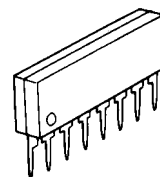
■ PACKAGE OUTLINE



NJM555D



NJM555M

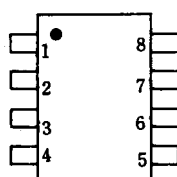


NJM555L

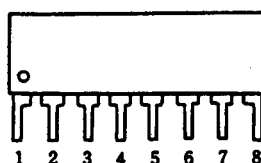


NJM555V

■ PIN CONFIGURATION



NJM555D
NJM555M
NJM555V

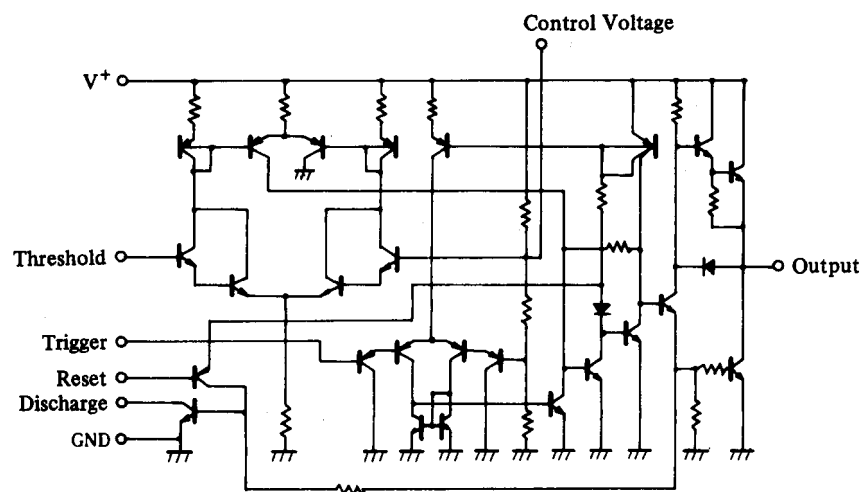


NJM555L

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°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°C)

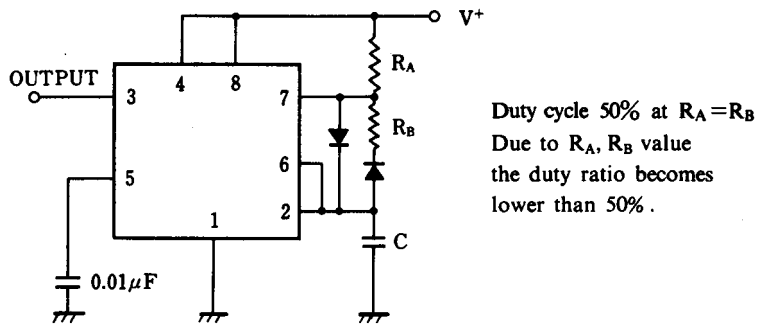
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V ⁺		4.5	-	16	V
Operating Current	I _{CC}	V ⁺ =5V, R _L =∞(Note 2)	-	3.0	6.0	mA
Operating Current	I _{CC}	V ⁺ =15V, R _L =∞(Note 2)	-	10	15	mA
Timing Error						
Initial Accuracy	E _t	T _a =-20 to 75°C, V ⁺ =5 to 15V(Note 3)	-	1.0	-	%
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	-	×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	-	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.)

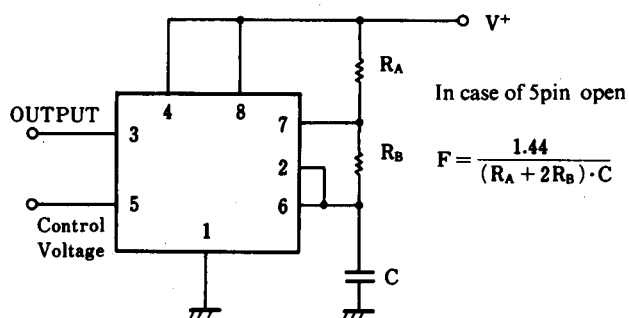
Note 3 : R_A, R_B=1k to 100kΩ, C=0.1μF, V⁺=15V from 5V

■ TYPICAL APPLICATION

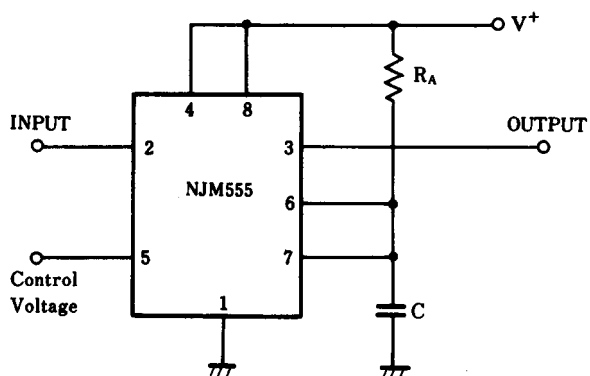
(1) 50% Duty Cycle Oscillator



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

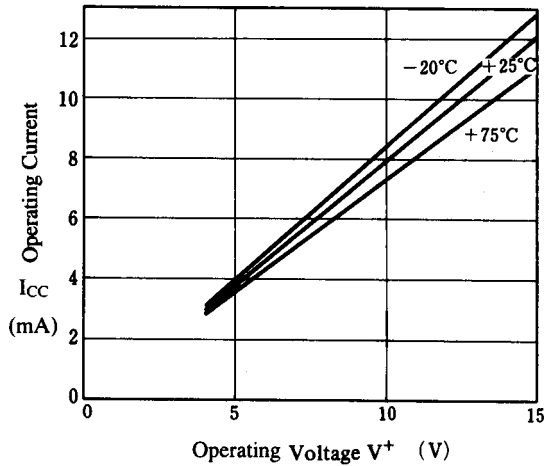


(3) Pulse Width Modulation

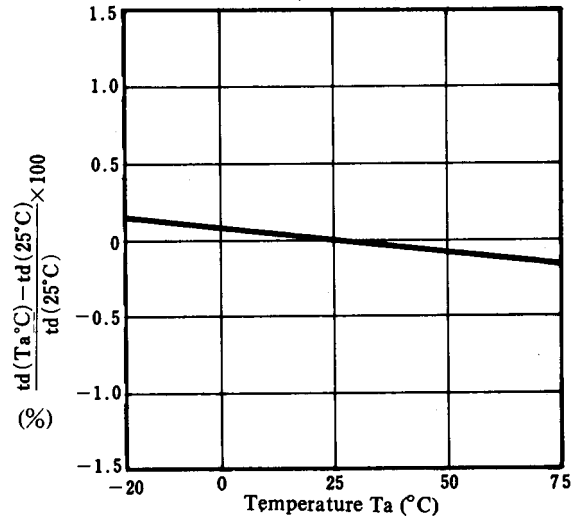


■ TYPICAL CHARACTERISTICS

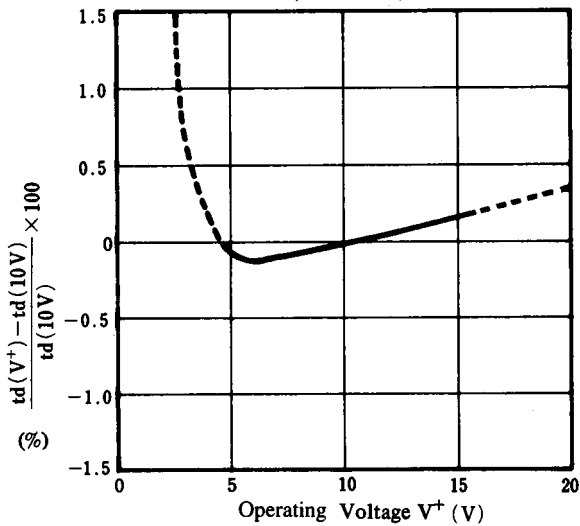
Operating Current vs. Operating Voltage
($V_{out} = \text{LOW STATE}$)



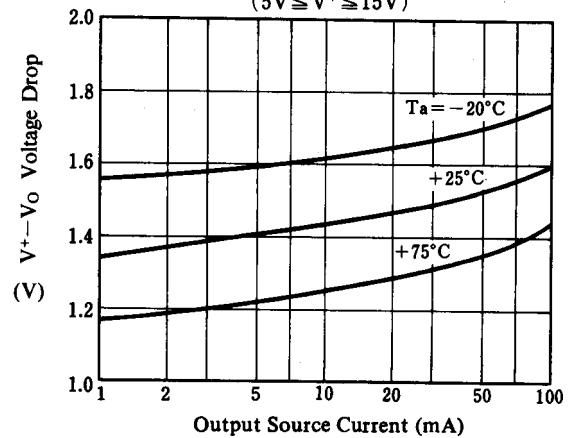
Delay Time vs. Temperature
($V^+ = 10V$)



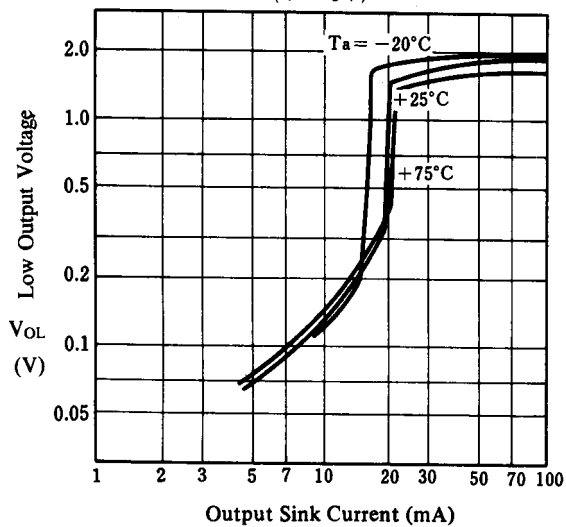
Delay Time vs. Operating Voltage
($T_a = 25^\circ\text{C}$)



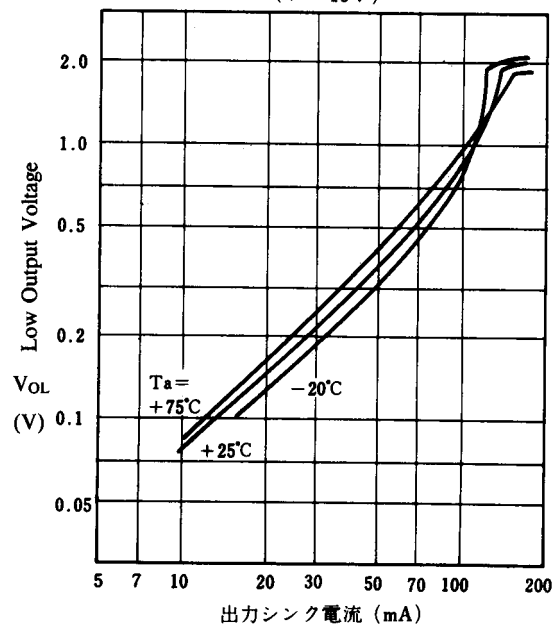
High Output Voltage Drop vs. Output Source Current
($5V \leq V^+ \leq 15V$)



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



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



■ TYPICAL CHARACTERISTICS

1. Monostable Operation

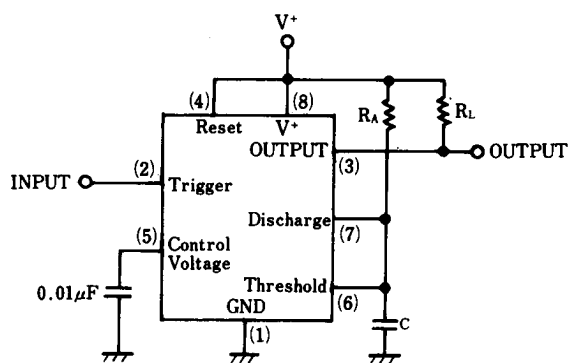


Fig. 1

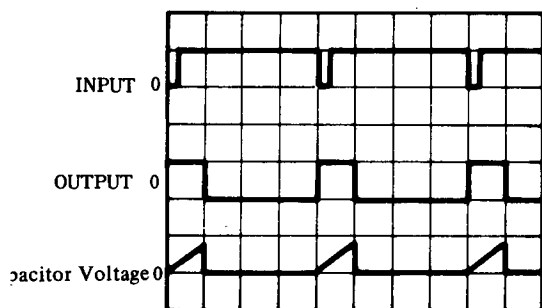
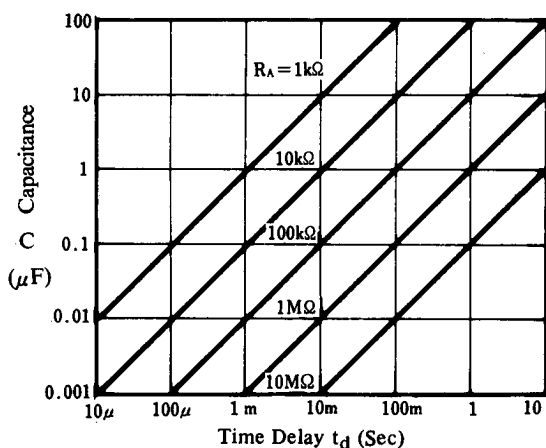


Fig.2 Wave Form



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

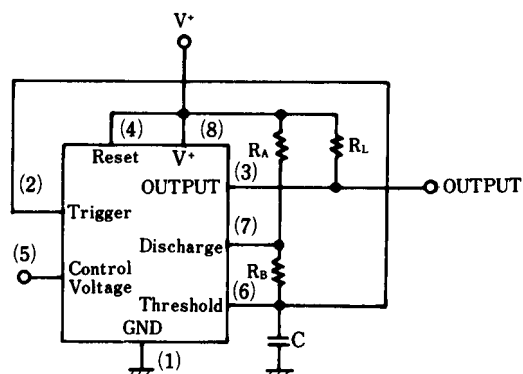


Fig. 3

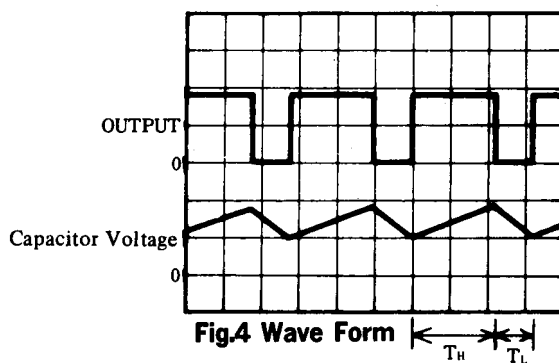
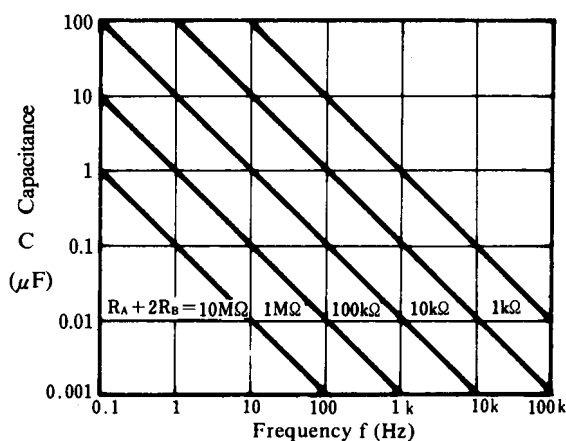


Fig.4 Wave Form



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]

The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.