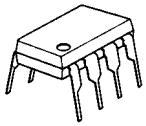
TIMER

■ GENERAL DESCRIPTION

The **NJM555** monolithic timing circuit is a highly stable controller capable of producing accruate 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.

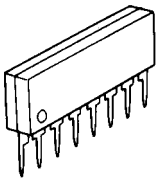
Terminals are provided for triggering and resetting. The circuit will trigger and reset on falling waveforms. The output can source or sink up to 200mA or drive TTL circuits.

■ PACKAGE OUTLINE



NJM555D

NJM555M



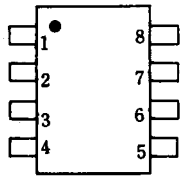
NJM555L

NJM555V

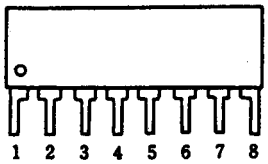
■ FEATURES

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

■ PIN CONFIGURATION



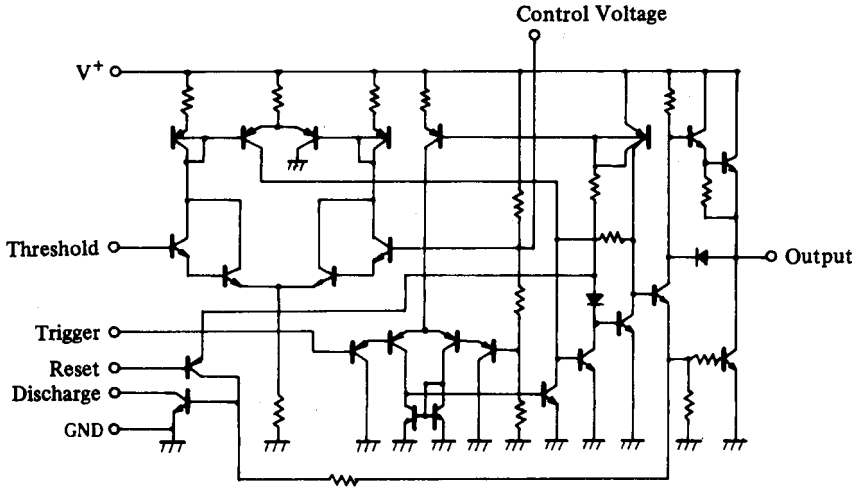
NJM555D
NJM555M
NJM555V



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

(T_a=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 to +85	°C
Storage Temperature Range	T_{stg}	-40 to +125	°C

■ ELECTRICAL CHARACTERISTICS

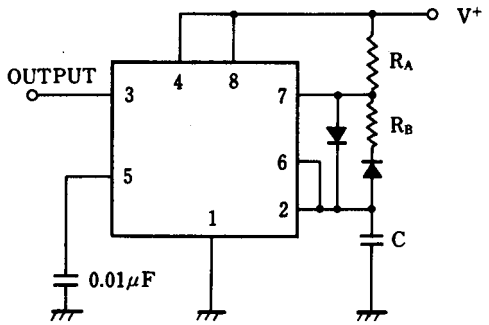
(V^+=5 to 15V, T_a=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V^+		4.5	-	16	V
Operating Current (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	T_a=-20 to 75°C, V^+=5 to 15V	-	1.0	-	%
Drift with Temperature	E_t	T_a=-20 to 75°C, V^+=5 to 15V	-	50	-	ppm / °C
Drift with Supply Voltage	E_t	T_a=-20 to 75°C, V^+=5 to 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 Curret	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_{OH}	V^+=15V Isource=200mA (Note 3)	-	12.5	-	V
Output Voltage (High)	V_{OH}	V^+=15V Isource=100mA (Note 3)	12.75	13.3	-	V
Output Voltage (High)	V_{OH}	V^+=15V Isource=40mA	-	13.5	-	V
Output Voltage (High)	V_{OH}	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 specificatio.)
Note 2 : R_A, R_B=1k to 100kΩ, C=0.1µF, V^+=15V from 5V
Note 3 : Not specified for NJM555M / NJM555E

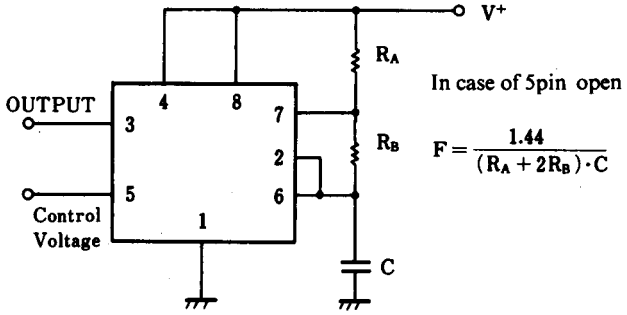
■ TYPICAL APPLICATION

(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%.

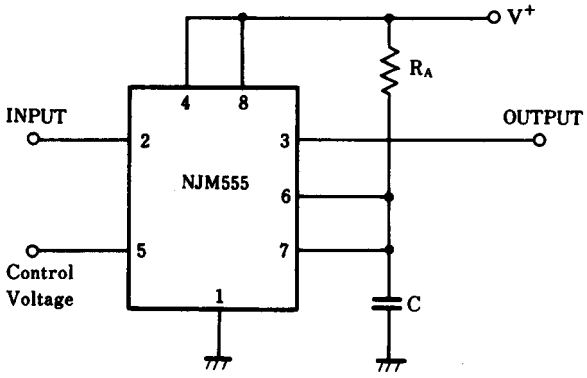
(2) Oscillation frequency can be changed by changing the control voltage.



In case of 5pin open

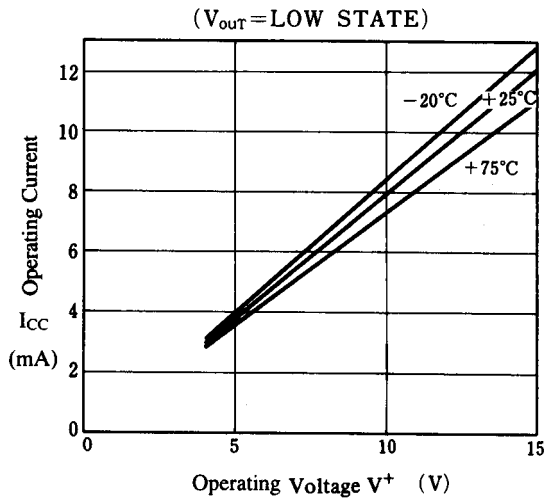
$$F = \frac{1.44}{(R_A + 2R_B) \cdot C}$$

(3) Pulse Width Modulation

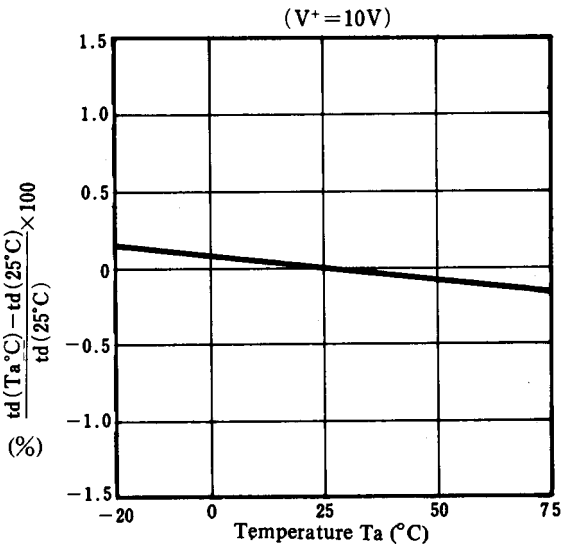


■ TYPICAL CHARACTERISTICS

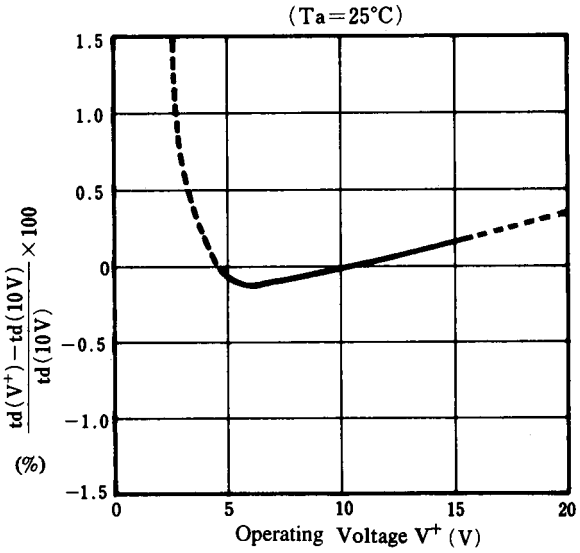
Operating Current vs. Operating Voltage



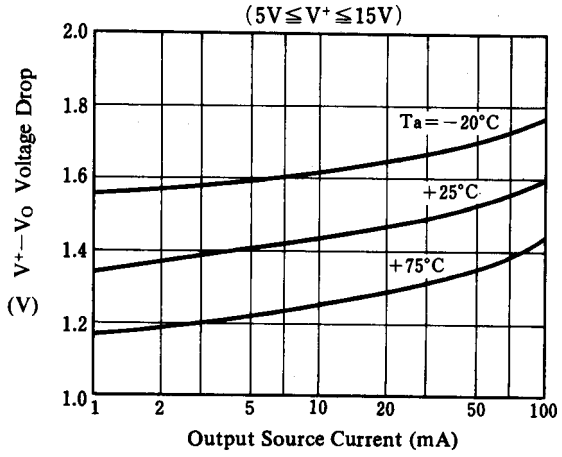
Delay Time vs. Temperature



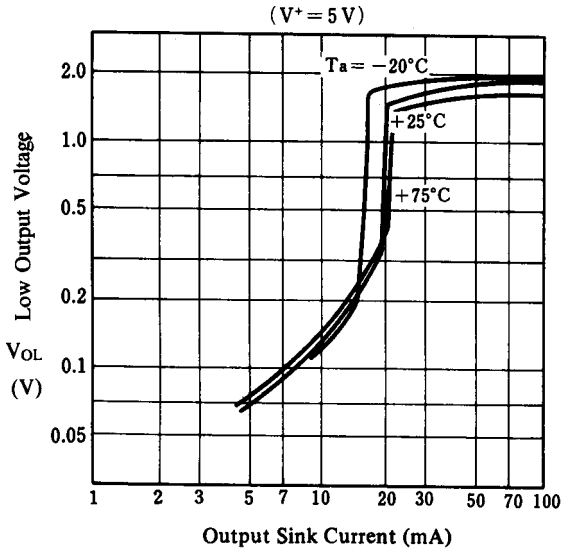
Delay Time vs. Operating Voltage



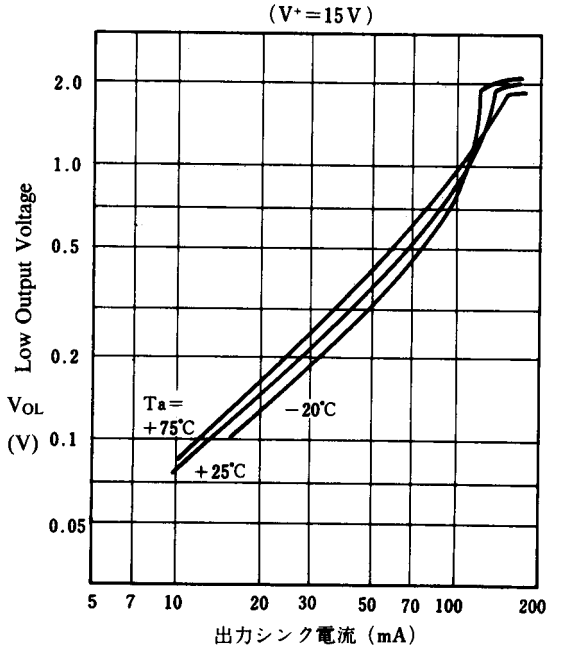
High Output Voltage Drop vs. Output Source Current



Low Output Voltage vs. Output Sink Current



Low Output Voltage vs. Output Sink Current



■ TYPICAL CHARACTERISTICS

1. Monostable Operation

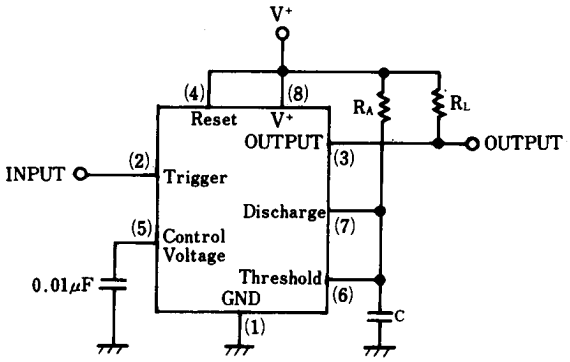


Fig. 1

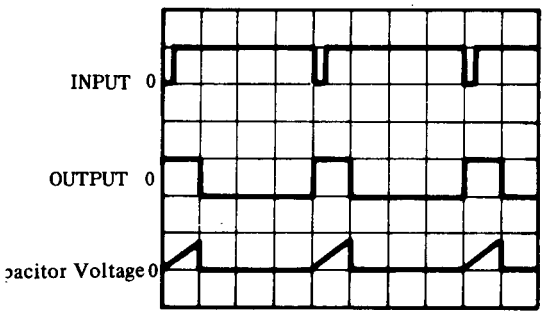
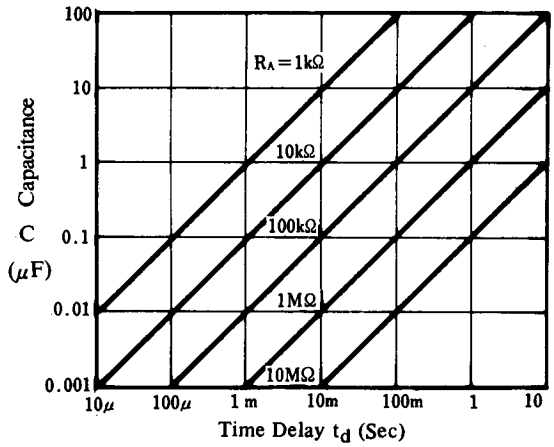


Fig.2 Wave Form



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

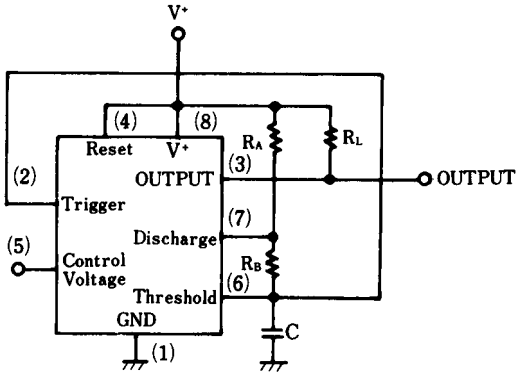


Fig. 3

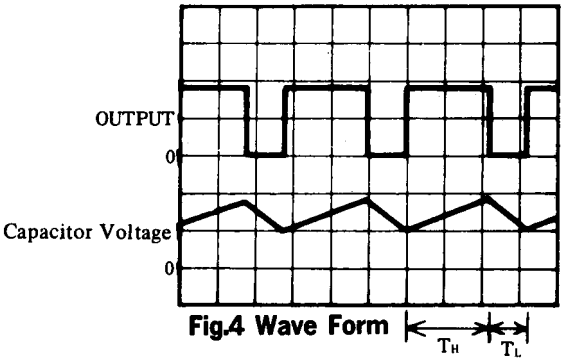
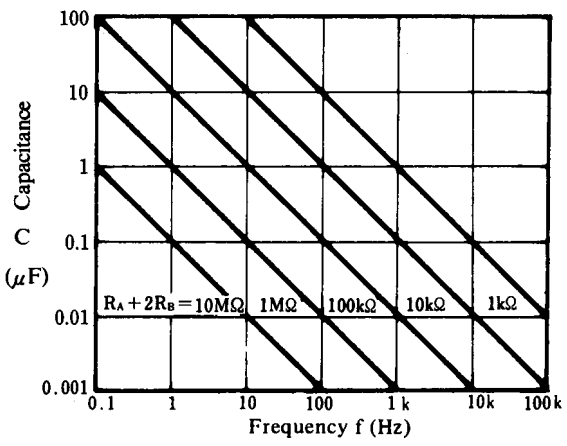


Fig.4 Wave Form



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:

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