

LOW VOLTAGE DC MOTOR CONTROLLER

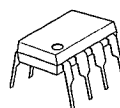
■ GENERAL DESCRIPTION

The NJM2606A is integrated circuit with wide operating supply voltage range for DC motor speed control. Especially, the NJM2606A is suited for 3V or 6V DC motor control.

■ FEATURES

- Operating Voltage (1.8V ~ 8V)
- Internal Low Saturation Voltage Output Transistor
- Package Outline DIP8, DMP8
- Bipolar Technology

■ PACKAGE OUTLINE

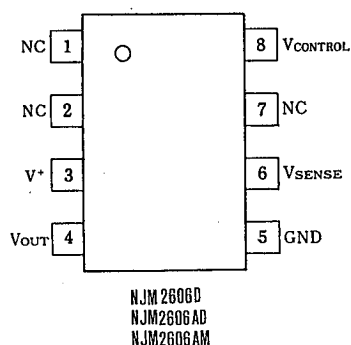


NJM2606D
NJM2606AD

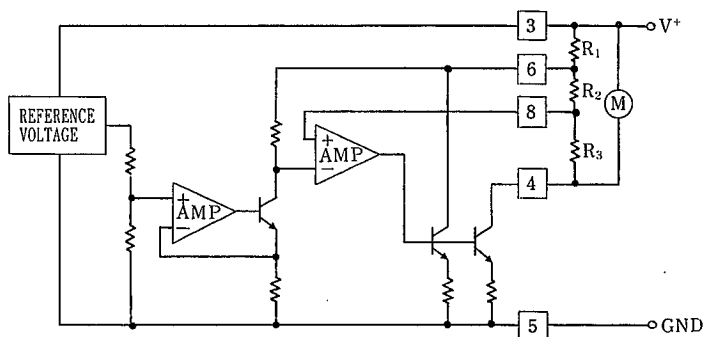


NJM2606M
NJM2606AM

■ PIN CONFIGURATION



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-----------------------------|------------------|------------|------|
| Supply Voltage | V ⁺ | 10 | V |
| Peak-to-peak Output Current | I _{OP} | 700 | mA |
| Power Dissipation | P _D | (DIP8) 500 | mW |
| | | (DMP8) 300 | mW |
| Operating Temperature Range | T _{OP} | -20~75 | °C |
| Storage Temperature Range | T _{STG} | -40~125 | °C |

(note) At SW ON. (3 sec. at motor locked or 100msec at duty factor less than 0.1%)

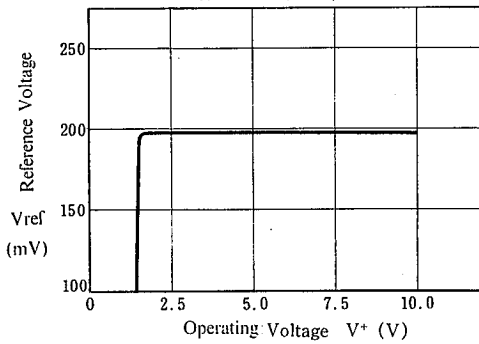
■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V⁺=3V, I_M=100mA)

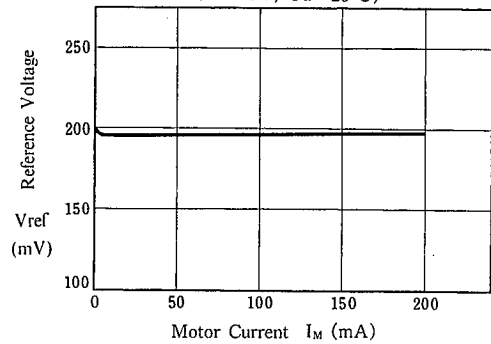
| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---------------------------|-------------------|-------------------------------------|------|------|------|-------|
| Operating Current | I _{CC} | | — | 2.4 | 6.0 | mA |
| Output Saturation Voltage | | | | | | |
| NJM2606 | V _{OSAT} | | — | 0.18 | 0.3 | V |
| NJM2606A | V _{OSAT} | | — | 0.13 | 0.18 | V |
| Reference Voltage | V _{REF} | | 0.18 | 0.20 | 0.22 | V |
| vs. Operating Voltage | ΔV _{RSV} | V ⁺ =1.8V~8.0V | — | 0.7 | 8.0 | mV |
| vs. Output Current | ΔV _{ROC} | I _M =20mA~200mA | — | 2.7 | 9.0 | mV |
| vs. Ambient Temperature | ΔV _{RT} | Ta=-20°C~+75°C | — | 0.04 | — | mV/°C |
| Current Ratio | K | I _M =50mA~150mA | 45 | 50 | 55 | |
| vs. Operating Voltage | ΔK _{SV} | V ⁺ =1.8V~8.0V | — | 0.6 | 3.0 | |
| | | I _M =50mA~150mA | | | | |
| vs. Output Current | ΔK _{OC} | I _M =(20~50)~(170~200)mA | — | 1.0 | 4.0 | |
| vs. Ambient Temperature | ΔK _{TC} | Ta=-20°C~+75°C | — | 1.0 | — | 1/°C |
| | | I _M =50mA~150mA | | | | |

■ TYPICAL CHARACTERISTICS

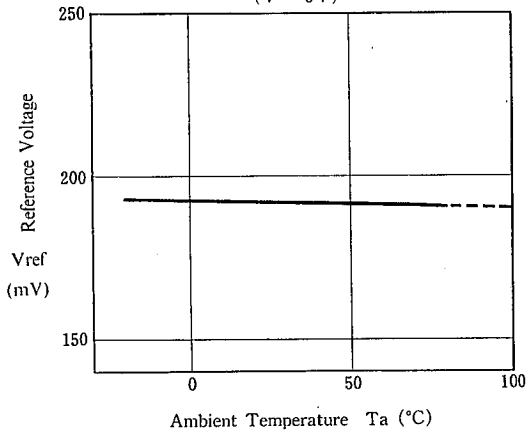
Reference Voltage vs. Operating Voltage
($I_M = 100\text{mA}$, $T_a = 25^\circ\text{C}$)



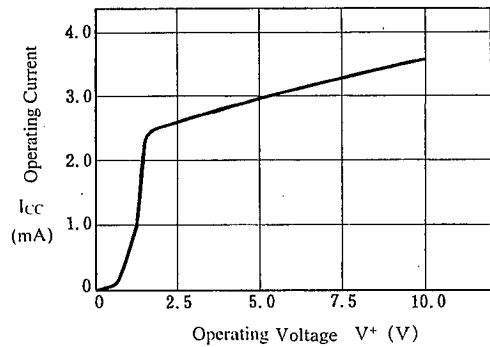
Reference Voltage vs. Motor Current
($V^+ = 3\text{V}$, $T_a = 25^\circ\text{C}$)



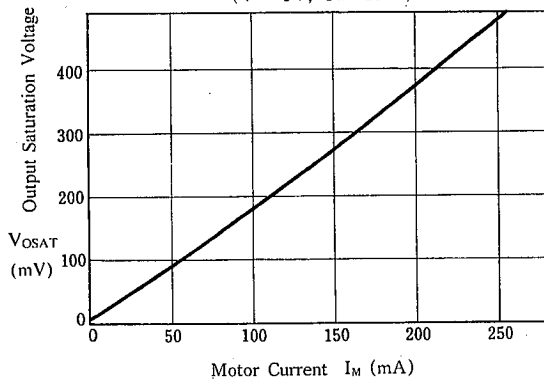
Reference Voltage vs. Temperature
($V^+ = 3\text{V}$)



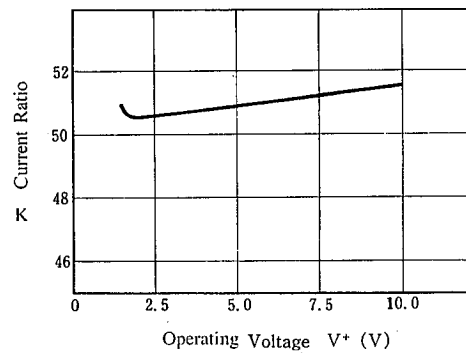
Operating Current vs. Operating Voltage
($T_a = 25^\circ\text{C}$)



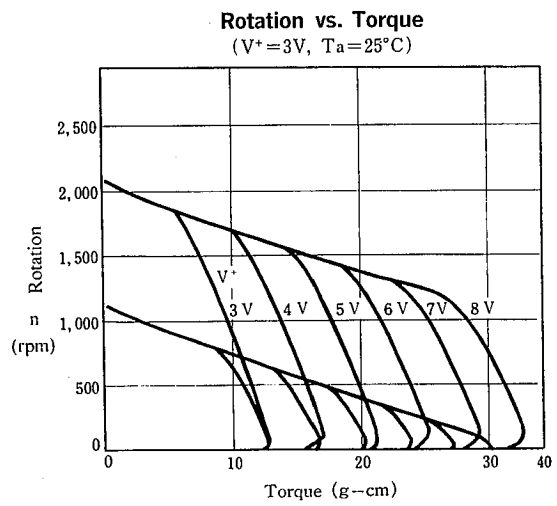
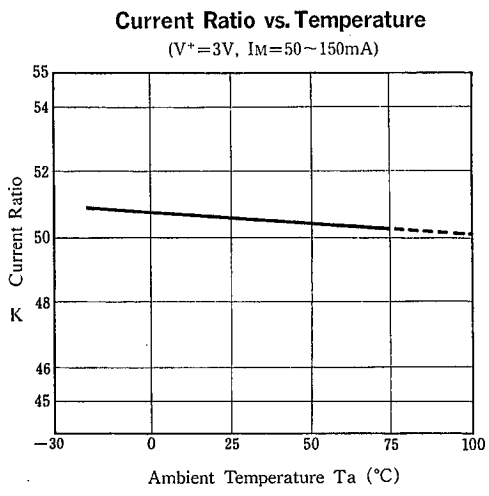
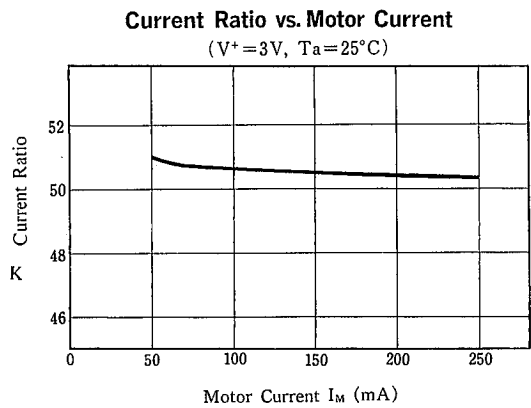
Output Saturation Voltage vs. Motor Current
($V^+ = 3\text{V}$, $T_a = 25^\circ\text{C}$)



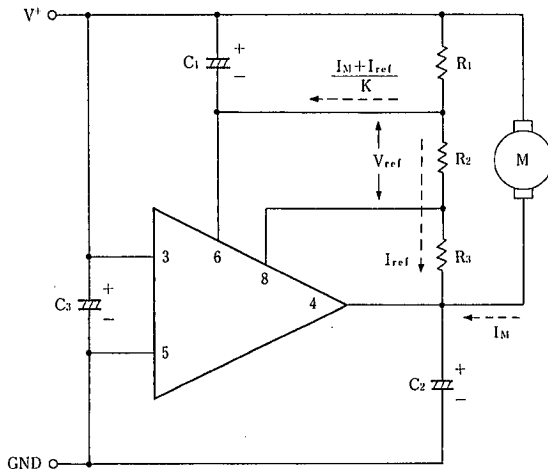
Current Ratio vs. Operating Voltage
($I_M = 50 - 150\text{mA}$, $T_a = 25^\circ\text{C}$)



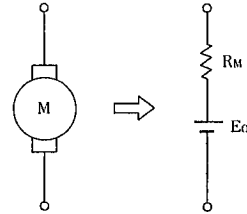
■ TYPICAL CHARACTERISTICS



■ TYPICAL APPLICATION



Select C_1 , C_2 , C_3 for each motor type.



V_{ref} : Reference Voltage
 K : Current Ratio
 I_M : Motor Current
 R_M : Internal Resistance of Motor
 E_0 : Motor Counter Electromotive Voltage

The voltage applied at the motor is set as V_M , which brings the following formula.

$$V_M = (R_1 + R_2 + R_3) I_{ref} + R_1 \cdot \frac{I_M + I_{ref}}{K}$$

Now that, $I_{ref} = V_{ref}/R_2$ so that, ($I_{ref} \approx 100\mu A$ setting is appropriate)

$$V_M = \frac{V_{ref}}{R_2} (R_1 + \frac{R_1}{K} + R_2 + R_3) + \frac{R_1}{K} I_M \dots\dots(1)$$

On the other hand, the voltage applied at the motor itself will be as in the following.

$$V_M = E_0 + R_M \cdot I_M \dots\dots(2)$$

Through (1), (2), and then leading to stabilize the control system.

$$R_M \cdot I_M > \frac{R_1}{K} \cdot I_M$$

$$\therefore R_1 < K \cdot R_M \dots\dots(3)$$

Taking in consideration of deviations, $R_{1(MAX)} < K_{(MIN)} \cdot R_{M(MIN)}$ with the condition.

Items required checking in regard to the temperature coefficient

IC items

1. Reference voltage: Temperature coefficient of V_{ref} .

2. Current Ratio: Temperature coefficient of K

※ External component items

3. Temperature coefficient of R_1 , R_2 and R_3

The relation among these 3 parts takes the very important roll.

4. Temperature coefficient of motor internal resistance

5. Temperature coefficient of motor generative voltage

6. Temperature coefficient ratio of R_1 and R_M

Count up from 3. 4.

MEMO

[CAUTION]

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