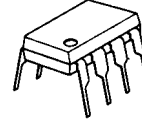


LOW VOLTAGE DC MOTOR CONTROLLER

■ GENERAL DESCRIPTION

The **NJM2606/06A** are integrated circuits with wide operating supply voltage range for DC motor speed control. Especially, the **NJM2606A** is suited for the applications requiring low saturation output voltage.

■ PACKAGE OUTLINE



NJM2606D
NJM2606AD

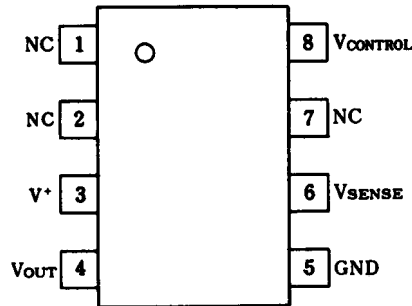


NJM2606M
NJM2606AM

■ FEATURES

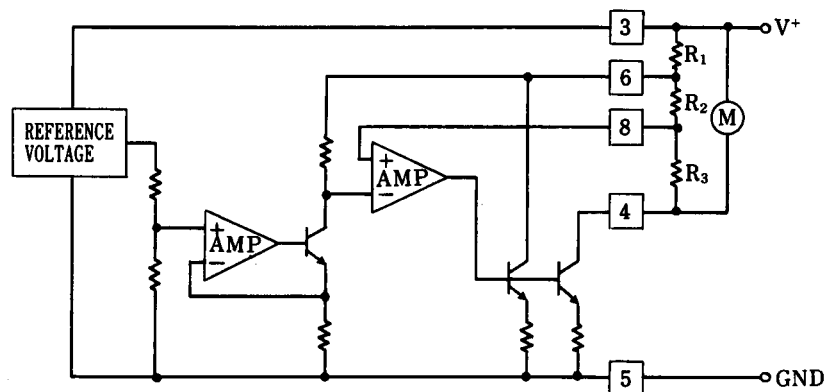
- Operating Voltage (1.8V to 8V)
- Internal Low Saturation Voltage Output Transistor
- Package Outline DIP8, DMP8
- Bipolar Technology

■ PIN CONFIGURATION



NJM2606D
NJM2606AD
NJM2606M
NJM2606AM

■ BLOCK DIAGRAM



NJM2606 / 2606A

■ ABSOLUTE MAXIMUM RATINGS

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

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	10	V
Peak-to-peak Output Current	I_{OP}	700	mA
Power Dissipation	P_D	(DIP) 500	mW
		(DMP8) 300	mW
Operating Temperature Range	T_{opr}	-20 to 75	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to 125	$^\circ\text{C}$

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

■ ELECTRICAL CHARACTERISTICS

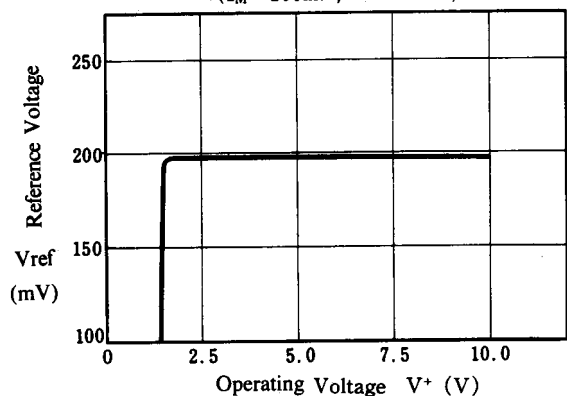
($T_a=25^\circ\text{C}$, $V^+=3\text{V}$, $I_M=100\text{mA}$)

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}	$V^+=1.8\text{V to }8.0\text{V}$	-	0.7	8.0	mV
vs. Output Current	ΔV_{ROC}	$I_M=20\text{mA to }200\text{mA}$	-	2.7	9.0	mV
vs. Ambient Temperature	ΔV_{RT}	$T_a=-20^\circ\text{C to }+75^\circ\text{C}$	-	0.04	-	mV / $^\circ\text{C}$
Current Ratio	K	$I_M=50\text{mA to }150\text{mA}$	45	50	55	
vs. Operating Voltage	ΔK_{SV}	$V^+=1.8\text{V to }8.0\text{V}$ $I_M=50\text{mA to }150\text{mA}$	-	0.6	3.0	
vs. Output Current	ΔK_{OC}	$I_M=(20\text{ to }50)\text{mA to } (170\text{ to }200)\text{mA}$	-	1.0	4.0	
vs. Ambient Temperature	ΔK_{TC}	$T_a=-20^\circ\text{C to }+75^\circ\text{C}$ $I_M=50\text{mA to }150\text{mA}$	-	1.0	-	1 / $^\circ\text{C}$

■ TYPICAL CHARACTERISTICS

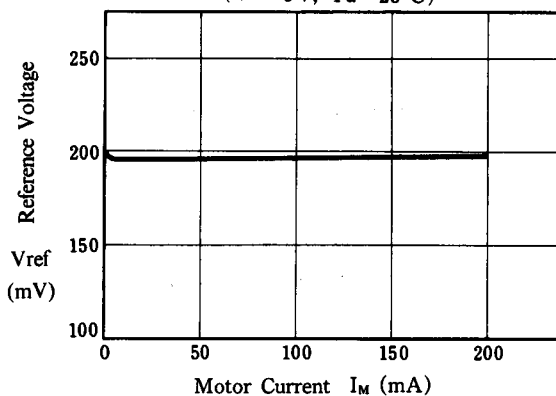
Reference Voltage vs. Operating Voltage

($I_M=100\text{mA}$, $T_a=25^\circ\text{C}$)



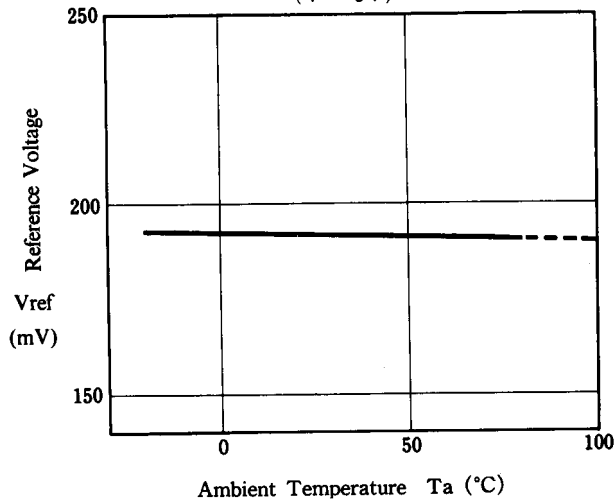
Reference Voltage vs. Motor Current

($V^+=3\text{V}$, $T_a=25^\circ\text{C}$)



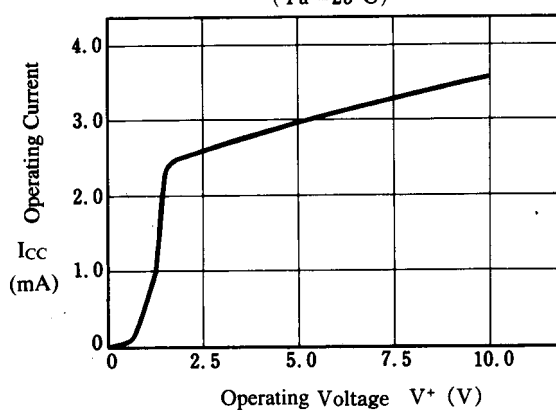
Reference Voltage vs. Temperature

($V^+=3\text{V}$)



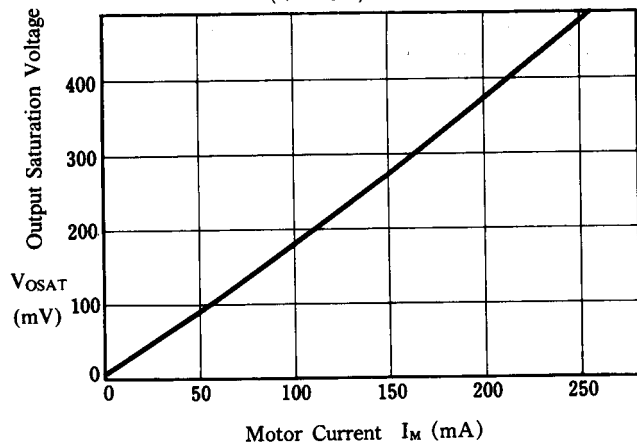
Operating Current vs. Operating Voltage

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



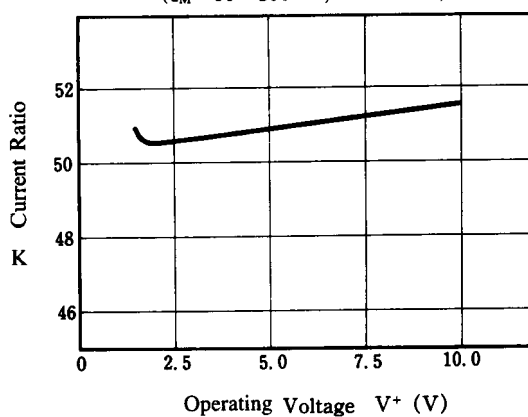
Output Saturation Voltage vs. Motor Current

($V^+=3\text{V}$, $T_a=25^\circ\text{C}$)



Current Ratio vs. Operating Voltage

($I_M=50-150\text{mA}$, $T_a=25^\circ\text{C}$)

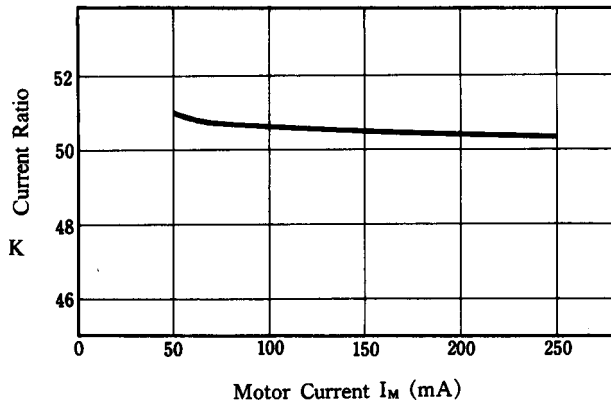


NJM2606 / 2606A

■ TYPICAL CHARACTERISTICS

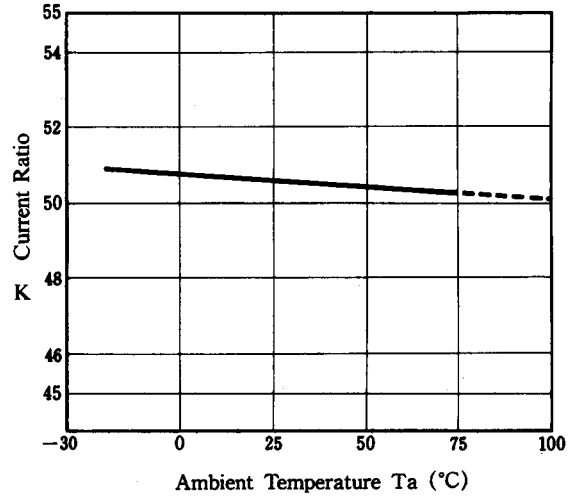
Current Ratio vs. Motor Current

($V^+ = 3V$, $T_a = 25^\circ C$)



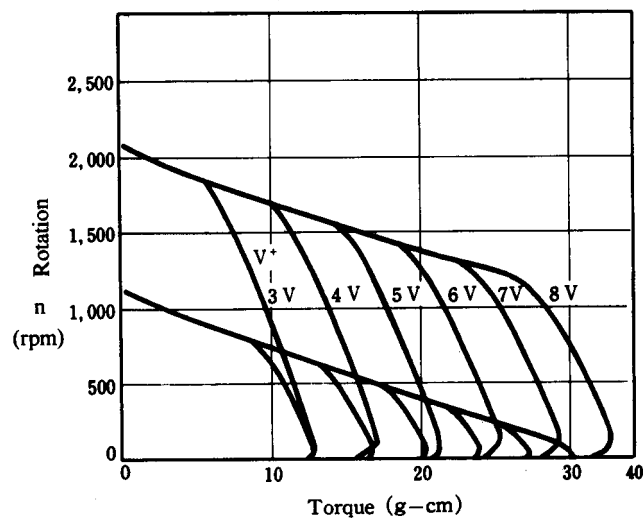
Current Ratio vs. Temperature

($V^+ = 3V$, $I_M = 50 \sim 150mA$)

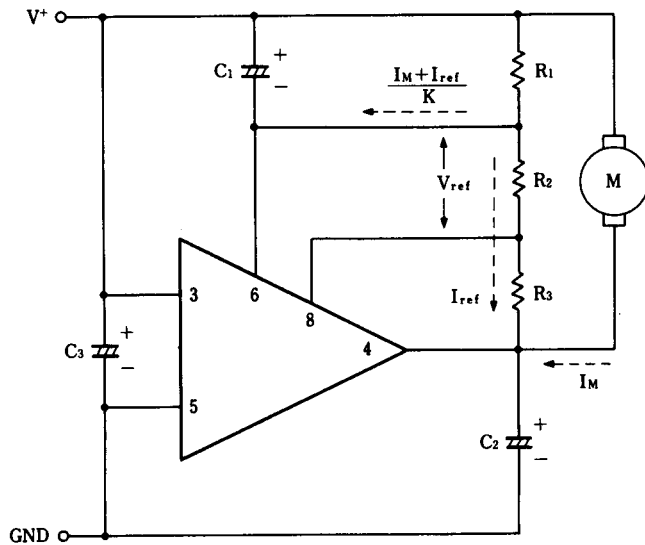


Rotation vs. Torque

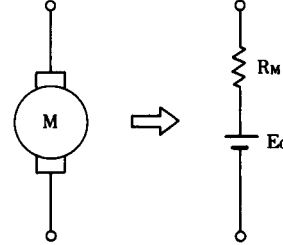
($V^+ = 3V$, $T_a = 25^\circ C$)



■ TYPICAL APPLICATION



Select C₁, C₂, C₃ for each motor type.



- V_{ref} : Reference Voltage
- K : Current Ratio
- I_M : Motor Current
- R_M : Internal Resistance of Motor
- E_O : 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} / R₂ so that, (I_{ref} ≐ 100μA setting is appropriate)

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

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

$$V_M = E_O + R_M \cdot I_M \quad \Delta \quad (2)$$

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

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

$$\therefore R_1 < K \cdot R_M \quad \Delta \quad (3)$$

Taking in consideration of deviations, R_{1(MAX)} < K_(MIN) · 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
*1 External component items
3. Temperature coefficient of R₁, R₂ and R₃
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 R₁ and R_M
Count up from 3.4.

[CAUTION]
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