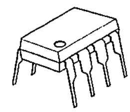
LOW VOLTAGE DC MOTOR CONTROLLER

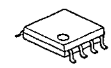
■ GENERAL DESCRIPTION

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.

■ PACKAGE OUTLINE



NJM2606D
NJM2606AD

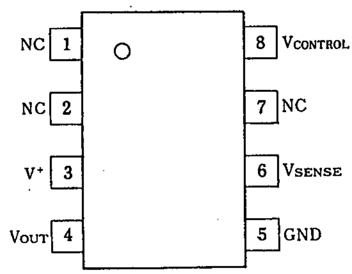


NJM2606M
NJM2606AM

■ FEATURES

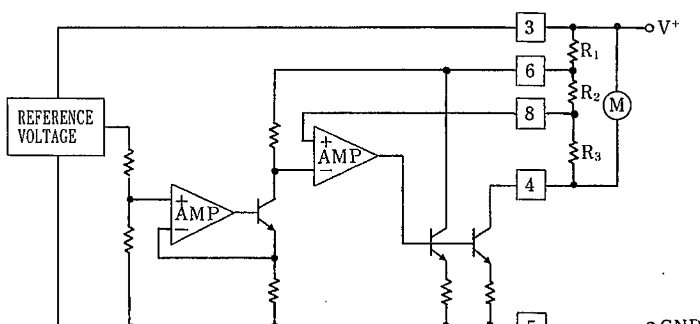
- Operating Voltage (1.8V~8V)
- Internal Low Saturation Voltage Output Transistor
- Package Outline DIP8, DMP8
- Bipolar Technology

■ PIN CONFIGURATION



NJM2606D
NJM2606AD
NJM2606AM

■ BLOCK DIAGRAM



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■ ABSOLUTE MAXIMUM RATINGS

(Ta=25℃)

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_{opr}	−20~75	℃
Storage Temperature Range	T_{stg}	−40~125	℃

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

■ ELECTRICAL CHARACTERISTICS

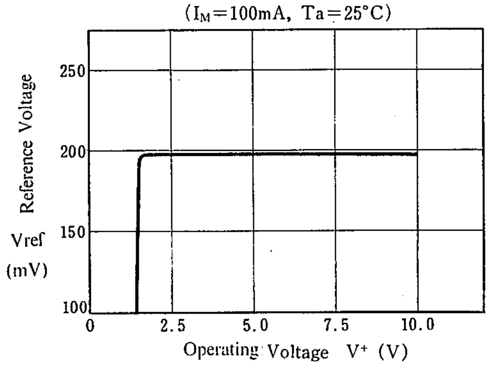
(Ta=25℃, V^+=3V, I_M=100mA)

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 I_M=50mA~150mA	—	0.6	3.0	
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 I_M=50mA~150mA	—	1.0	—	1/°C

■ TYPICAL CHARACTERISTICS

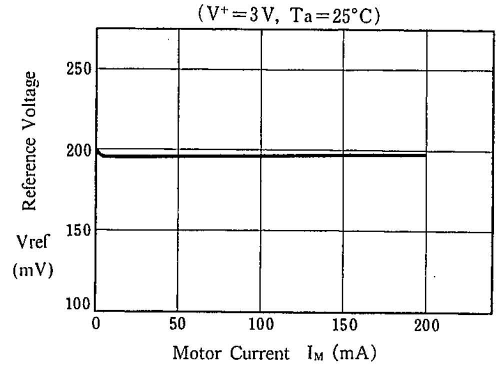
Reference Voltage vs. Operating Voltage

(I_M=100mA, Ta=25°C)



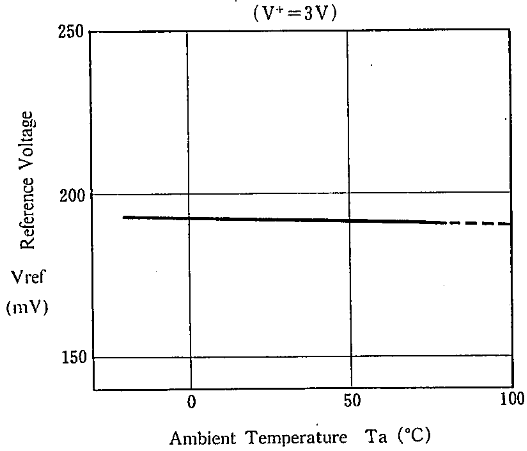
Reference Voltage vs. Motor Current

(V^+=3V, Ta=25°C)



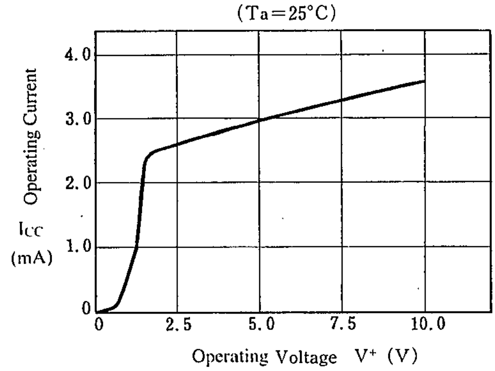
Reference Voltage vs. Temperature

(V^+=3V)



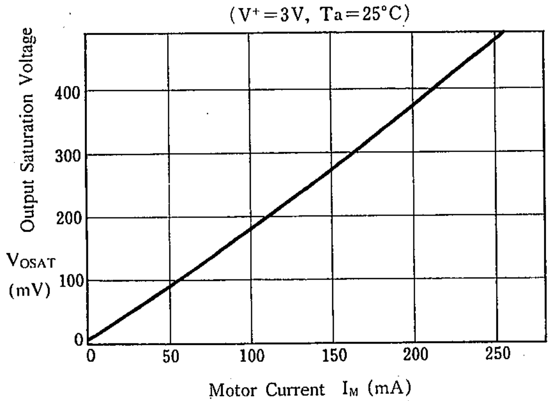
Operating Current vs. Operating Voltage

(Ta=25°C)



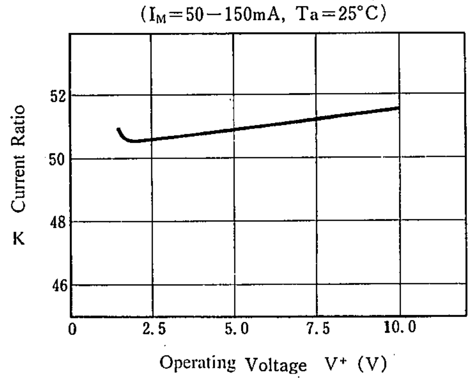
Output Staturation Voltage vs. Motor Current

(V^+=3V, Ta=25°C)



Current Ratio vs. Operating Voltage

(I_M=50−150mA, Ta=25°C)



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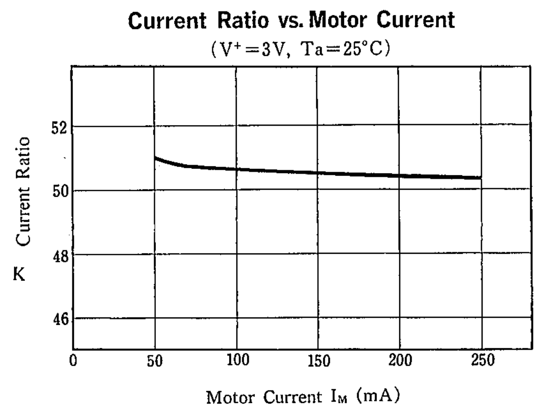
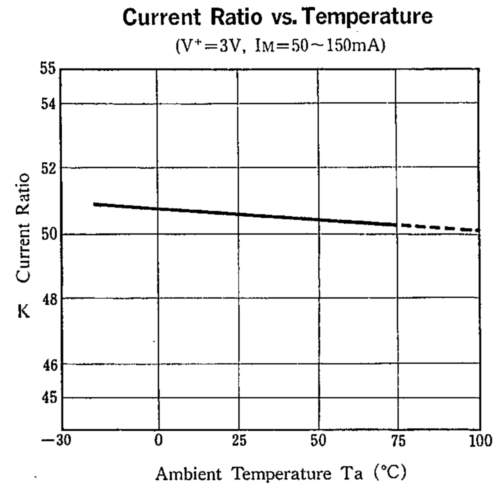
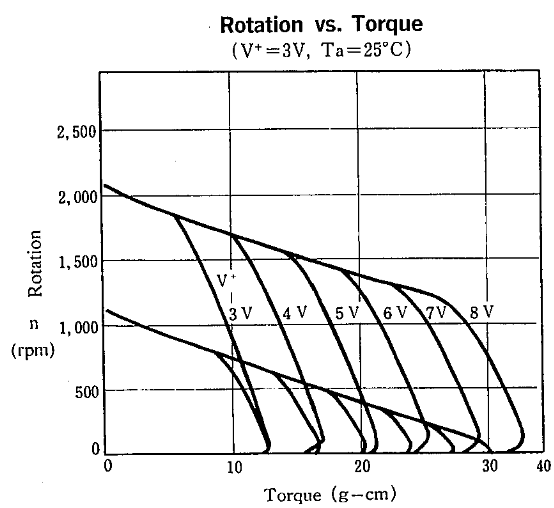
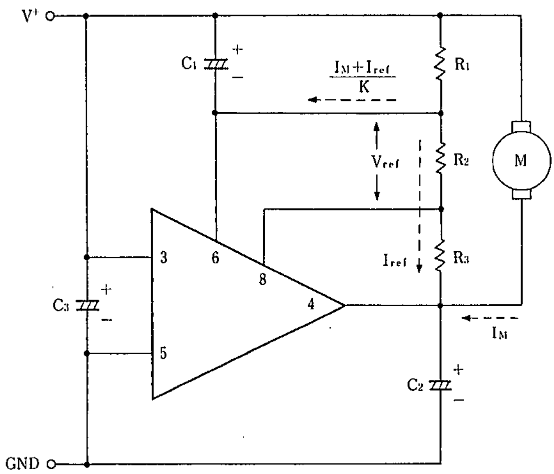
■ TYPICAL CHARACTERISTICS



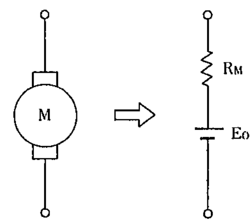




■ TYPICAL APPLICATION



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_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, $I_{ref}=V_{ref}/R_2$ so that, ($I_{ref}\doteqdot100\mu A$ setting is appropriate)

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

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

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

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

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

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

Taking in consideration of deviatons , $R_{1(MAX)}<K_{(MIN)}\cdot R_{M(MIN)}$ 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

※ I 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.

6

MEMO