

## SERVO MOTOR CONTROLLER

### ■ GENERAL DESCRIPTION

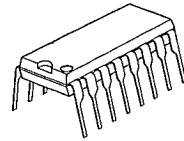
The NJM2611 is an integrated circuit to be applied on servo motor of radio controlled operation. Wide range of operating voltage, and the NJM2611 has the feature of internal circuit of maintaining constant voltage which helps stabilizing from fluctuation caused by voltage source and the ambient temperature.

### ■ FEATURES

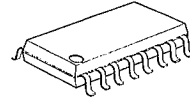
- Wide Operating Voltage
- Setting up the dead band by the internal constant
- Internal Output NPN Power Transistor
- Internal Constant Voltage Circuit
- Package Outline
- Bipolar Technology

DIP16, DMP16

### ■ PACKAGE OUTLINE

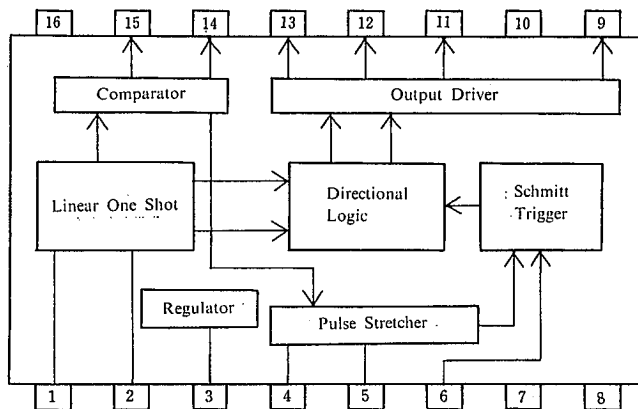


NJM2611D



NJM2611M

### ■ BLOCK DIAGRAM



NJM2611D/M

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## ■ ABSOLUTE MAXIMUM RATINGS

(V<sup>+</sup>=6V, T<sub>a</sub>=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup>	10.0	V
Power Dissipation	P <sub>D</sub>	(DIP16) 700 (DMP16) 350	mW
Output Sink Current	I <sub>sink</sub>	600(note)	mA
Operating Temperature Range	T <sub>opr</sub>	-20 ~ +75	°C
Storage Temperature Range	T <sub>stg</sub>	-40 ~ +125	°C

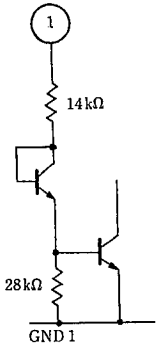
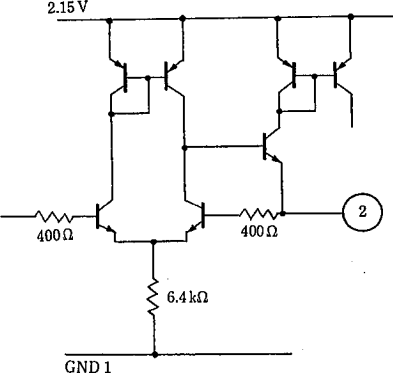
(note) Due to the pulse driving, the peak current must be maintained within the range of the maximum ratings.

## ■ ELECTRICAL CHARACTERISTICS

(V<sup>+</sup>=6V, T<sub>a</sub>=25°C)

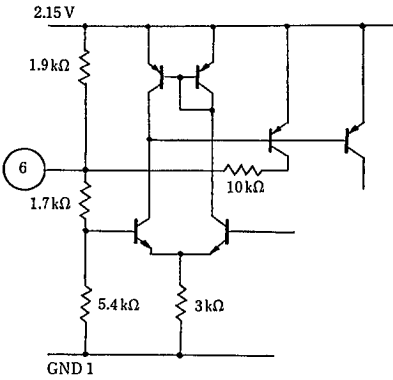
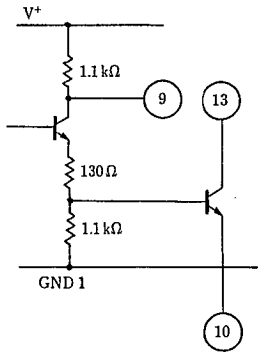
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V <sup>+</sup>		2.5	—	7.5	V
Operating Current	I <sub>CC</sub>		—	7.5	10.0	mA
Minimum Input Pulse Voltage Range	V <sub>IN</sub>	At the balanced output	1.85	—	—	V
Regulator Voltage	V <sub>REG</sub>		2.0	2.15	2.3	V
Line Regulation	V <sub>IIR</sub>	V <sup>+</sup> =2.5~8.5V	—	—	30	mV
Output Saturation Voltage	V <sub>SAT</sub>	Load 12Ω	—	—	0.5	V
Dead Band	T <sub>DB</sub>		—	4.0	—	μs

## ■ PIN DISCRPTION

PIN NO.	PIN FUNCTION	DESCRIPTION	INSIDE EQUIVALENT CIRCUIT
1	$V_{IN}$	Input the positive pulse of more than 1.85V.	 <p>The diagram shows an input terminal labeled '1' connected to a 14kΩ resistor. The other end of this resistor is connected to the base of a transistor. The emitter of this transistor is connected to GND1. The collector is connected to the base of a second transistor. The emitter of the second transistor is connected to GND1. A 28kΩ resistor is connected between the collector of the second transistor and GND1.</p>
2	$R_{REF}$	Constant output voltage of 1.25V (typical). Through the resistor which is connected to this pin, and setting up the constant current to make the saw tooth sweep at pin 14. Connect the capacitor of approximately 1000 pF with the resistor on parallel.	 <p>The diagram shows a 2.15V supply connected to the bases of two transistors. The emitters of these transistors are connected to GND1. The collectors are connected to the bases of two other transistors. The emitters of these second transistors are connected to GND1. A 6.4kΩ resistor is connected between the collector of the second transistor and GND1. Two 400Ω resistors are connected between the collector of the first transistor and pin 2, and between the collector of the second transistor and pin 2.</p>

PIN NO.	PIN FUNCTION	DESCRIPTION	INSIDE EQUIVALENT CIRCUIT
3	$V_{reg}$	Connect the resistors along to the motor interlocking potentiometer pulse stretcher. Connect the capacitor of more than $0.1\mu F$ .	
4	PS1	Connect the resistor between $V_{ref}$ . The pulse gain can be decided by this resistor and the capacitor connected to pin 5.	
5	PS2	Connect the capacitor between GND. The pulse gain can be decided by this condenser and the resistor connected to pin 4.	

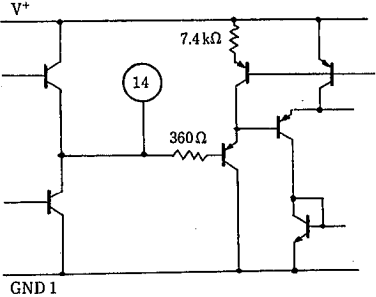
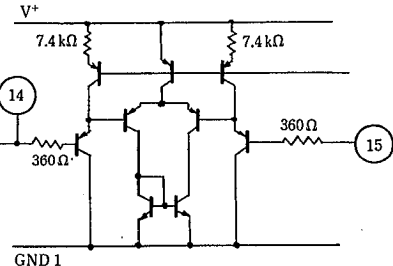
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PIN NO.	PIN FUNCTION	DESCRIPTION	INSIDE EQUIVALENT CIRCUIT
6	PSV	<p>Nomally, this pin is used on the open state of operation. Especially, when it is required to make the adjustment of the dead band, connect the resistor between GND and then the dead band can be made it's expansion.</p> <p>(Refere to, dead band pin 6 voltage vs. pin 6 sink current characteristic)</p>	
7	NC	No connect	
8	GND1	System GND.	
9	PNP1	Connect the external PNP transistor ( $Q_2$ ) base.	
10	GND2	<p>Power GND</p> <p>Large pulse current is running, therefore, connect the line by separating from the sytem GND.</p>	

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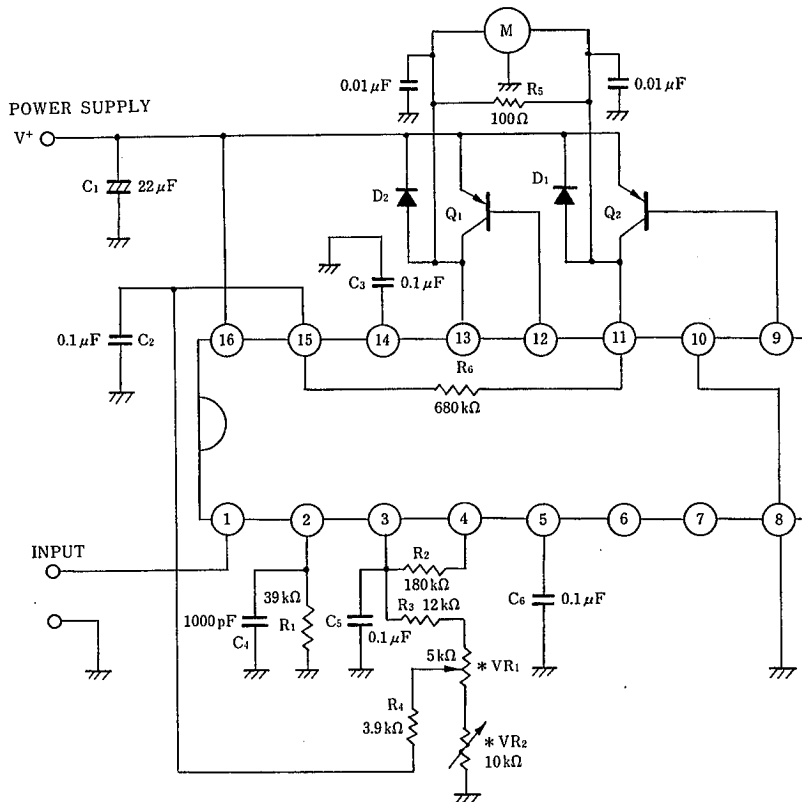
PIN NO.	PIN FUNCTION	DESCRIPTION	INSIDE EQUIVALENT CIRCUIT
11	OUT1	Connect the collector of the external PNP transistor, the base of which is connected to pin 9. Connect the motor between pin 13.	
12	PNP2	Connect the external PNP transistor (Q <sub>1</sub> ) base.	
13	OUT2	Connect the collector of the external PNP transistor, the base of which is connected to pin 12. Connect the motor between pin 11.	

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PIN NO.	PIN FUNCTION	DESCRIPTION	INSIDE EQUIVALENT CIRCUIT
14	C <sub>P</sub>	Connect the sawtooth wave generating capacitor. The motor's position shall be decided at the peak point of sawtooth wave, so that it is advisable to select the higher precision capacitor as well as the resistor connected to pin 2.	
15	COMP	The center part of potentiometer of motor motion is to be connected. The capacitor of about 0.1μF is to be connected between GND for preventing noise. The center location can be adjusted by putting the resistor in series with the potentiometer.	
16	V <sup>+</sup>	Power Supply	

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■ TYPICAL APPLICATION



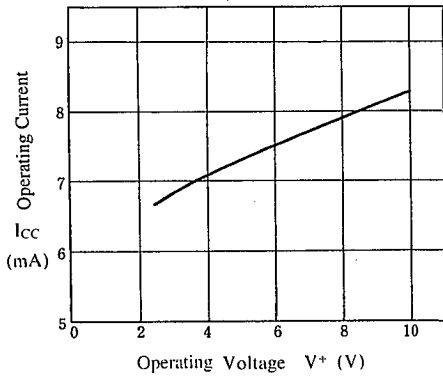
Notes

- (1) VR<sub>1</sub> : Potentiometer coupled mechanically to the servo motor
- (2) VR<sub>2</sub> : Adjusting the motor center location
- (3) Hunching prevention
  - 0.01 μF Capacitor between pin 11 and GND
  - 0.01 μF Capacitor between pin 13 and GND
  - Diode between pin 11 and power supply
  - Diode between pin 13 and power supply
  - 100 Ω Resistor between pin 11 and pin 13
  - 680 kΩ Resistor between pin 11 and GND

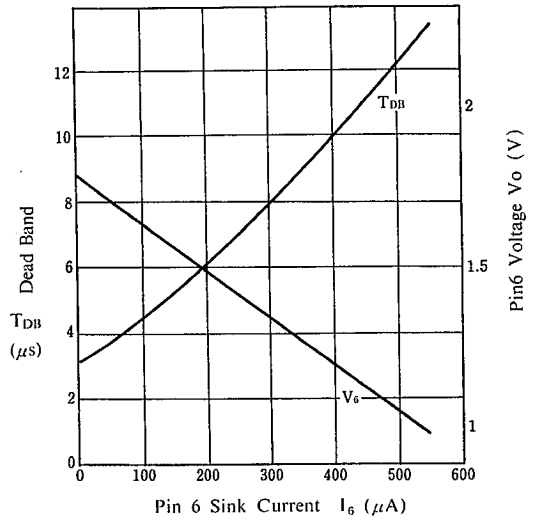


## ■ TYPICAL CHARACTERISTICS

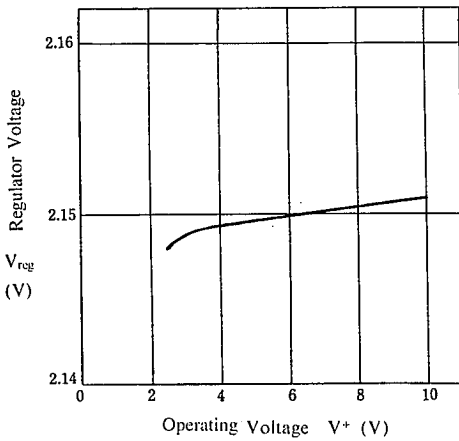
**Operating Current vs. Operating Voltage**  
( $T_a = 25^\circ\text{C}$ )



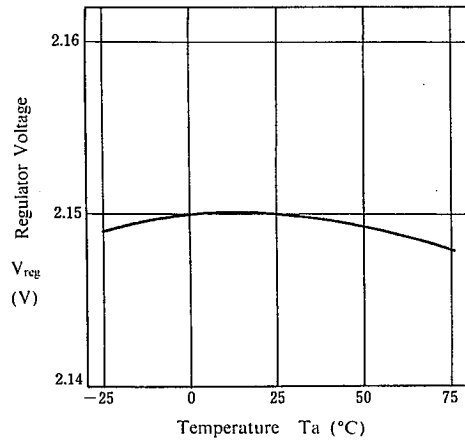
**Dead Band Pin 6 Voltage vs. Pin 6 Sink Current**



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



**Regulator Voltage vs. Temperature**  
( $V^+ = 6\text{V}$ )



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## MEMO

[CAUTION]

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