

# M51660L

## SERVO MOTOR CONTROL FOR RADIO CONTROL

### DESCRIPTION

The M51660L is a semiconductor integrated circuit for use in servo motor control in radio control applications. Housed in a 14-pin molded plastic zig-zag inline package (ZIP), the M51660L contributes to the miniaturization of the set. The built-in voltage regulating circuit, and the differential comparator used in the comparator circuit provide the M51660L with extremely stable power supply voltage fluctuation characteristics and temperature change characteristics.

### FEATURES

- Small circuit current ..... 3.5mA typ.  
(When output is off)
- Excellent power supply and temperature stability
- Simple setting of dead band
- Includes protection circuit for continuous "H" level input

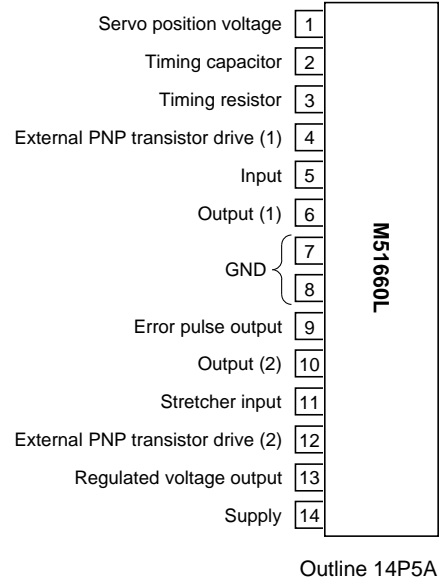
### APPLICATION

Digital proportional system for radio control, and servo motor control circuit, etc.

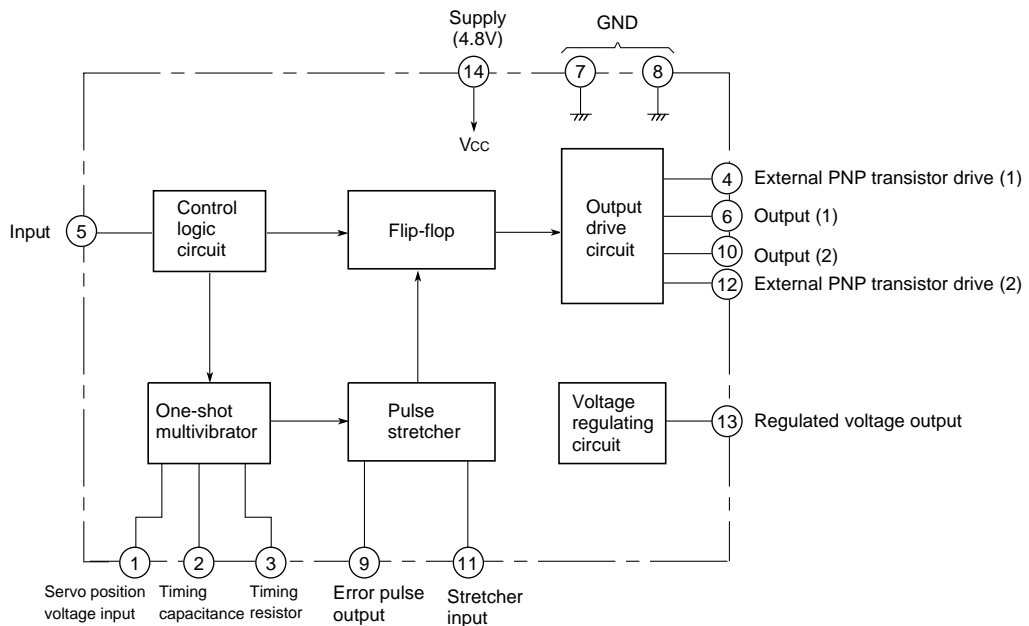
### RECOMMENDED OPERATING CONDITIONS

- Supply voltage range ..... 3.5 – 7V
- Rated supply voltage ..... 4.8V

### PIN CONFIGURATION (TOP VIEW)



### BLOCK DIAGRAM



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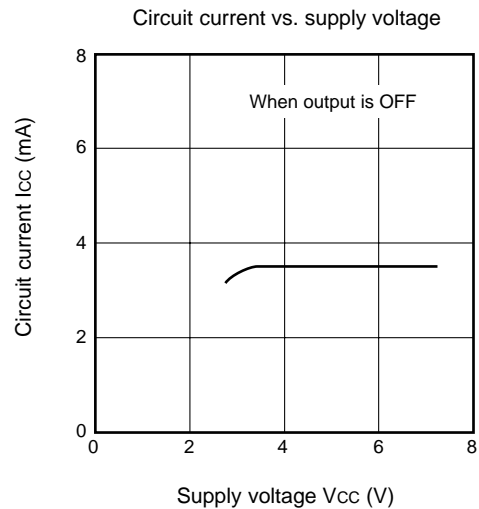
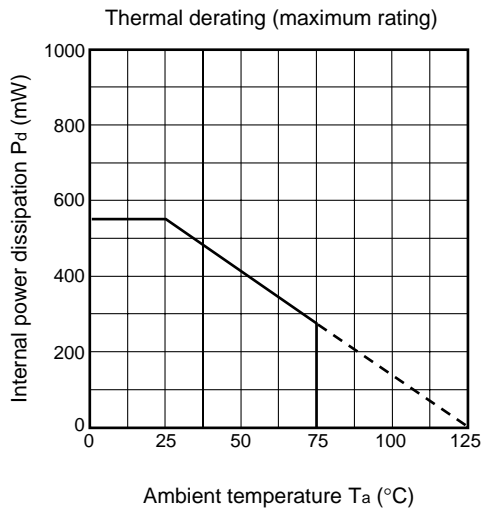
**ABSOLUTE MAXIMUM RATINGS** (Ta = 25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
VCC	Supply voltage		7.5	V
IO SINK	Output sink current		500	mA
IO SOURCE	Output source current		200	mA
Pd	Power dissipation		550	mW
Kθ	Thermal derating range	Ta ≥ 25°C	5.5	mW/°C
Topr	Operating temperature		-20 – +75	°C
Tstg	Storage temperature range		-40 – +125	°C

**ELECTRICAL CHARACTERISTICS** (Ta = 25°C and VCC = 4.8V, unless otherwise noted)

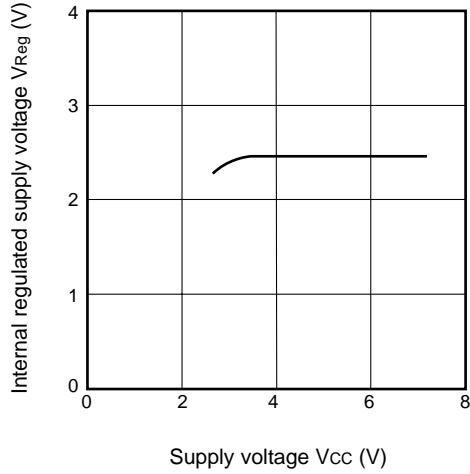
Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
ICC	Circuit current	When output is OFF		3.5	5	mA
		When output is ON		20		
VOL	Output voltage "L"	IO SINK = 100mA		0.1	0.2	V
		IO SINK = 400mA		0.4	0.7	
VOH	Output voltage "H"	IO SOURCE = 100mA	3.4	3.8		V
IPNP	External PNP transistor Drive current		30			mA
VReg	Internal regulated supply voltage		2.3	2.45	2.6	V
IReg	Internal regulated supply output current				3.0	mA
TDB	Minimum dead band width	RDB = 510Ω, Cs = 0.1μF			1.5	μs

**TYPICAL CHARACTERISTICS** (Ta = 25°C, unless otherwise noted)

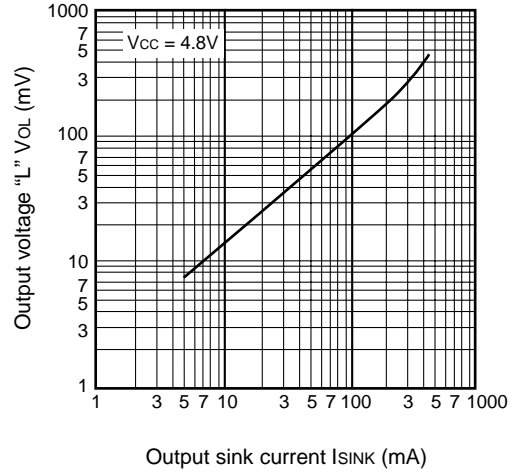


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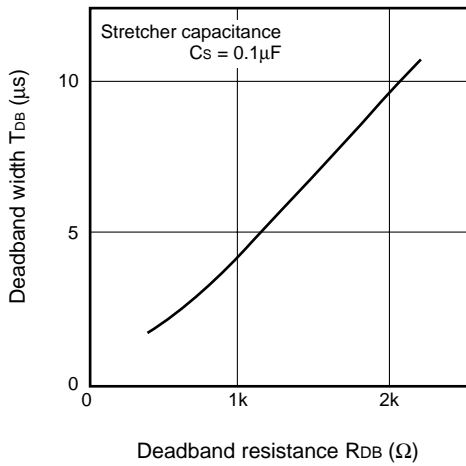
Internal regulated supply voltage vs. supply voltage



Output voltage "L" vs. output sink current

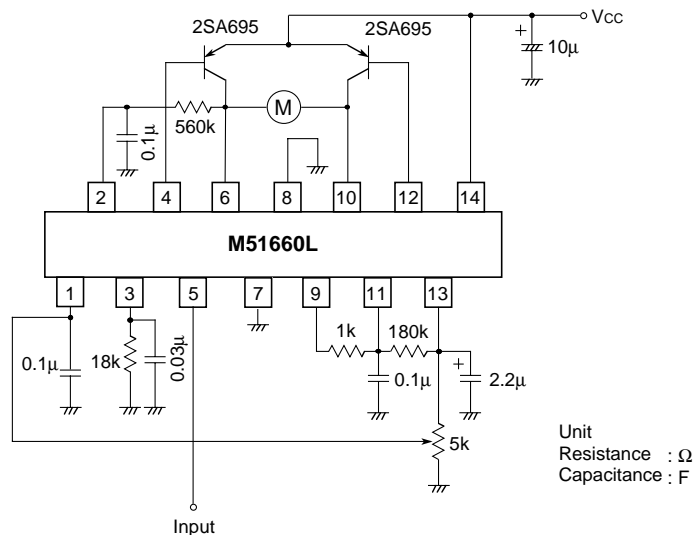


Deadband width vs. deadband resistance



**APPLICATION EXAMPLE**

**Servo motor control circuit for radio-controlled**



**TECHNICAL APPLICATION NOTES****PIN DESCRIPTION**

- 1. Servo Position Voltage Input Pin (Pin ①)**  
Connect the potentiometer terminal for position detection that follows the output axis. Compare this voltage with the voltage of the triangular wave of pin ② and drive the motor. A capacitor of approximately 0.1 $\mu$ F should be connected for noise prevention.
  - 2. Timing Capacitor Pin (Pin ②)**  
Connect a capacitor that will generate a triangular wave by constant current charging. A typical value is 0.1 $\mu$ F. Also connect a feedback resistor from the output here.
  - 3. Timing Resistor (Pin ③)**  
Connect a resistor that will determine the value of the constant current of pin ②. A resistor of 18k $\Omega$  will yield a current of 1.0mA. A capacitor of approximately 0.03 $\mu$ F should be connected in parallel with the resistor to increase stability.
  - 4. External PNP Transistor Drive ① (Pin ④)**  
Connect to the base of the external PNP transistor.
  - 5. Input Pin (Pin ⑤)**  
Operate with a positive pulse of peak value 3V or greater.
  - 6. Output ① Pin (Pin ⑥)**  
Connect a feedback resistor between this pin and pin ②.
  - 7. Ground (pins ⑦ and ⑧)**
  - 8. Error Pulse Output pin (Pin ⑨)**  
Connect a resistor between this pin and pin ⑩. The dead band will change according to the value of this resistor.
  - 9. Output ② pin (Pin ⑩)**  
This is the output ② pin.
  - 10. Stretcher Input Pin (Pin ⑪)**  
Connect the capacitor and resistor of the pulse stretcher section.
  - 11. External PNP Transistor Drive ② (Pin ⑫)**  
Connect to the base of the external PNP transistor.
  - 12. Regulated Voltage Output Pin (Pin ⑬)**  
This is the output of the internal regulated supply voltage. Make connections from this pin to a potentiometer or pulse stretcher resistor. Connect a capacitor of approximately 2.2 $\mu$ F for stability.
  - 13. Supply Voltage (Pin ⑭)**  
The supply voltage exhibits uniform characteristics from 3.5V to 7V. Connect a capacitor of approximately 10 $\mu$ F.
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