

**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

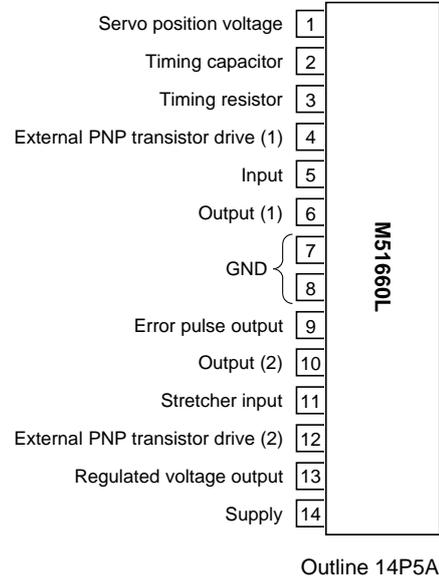
**APPLICATION**

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

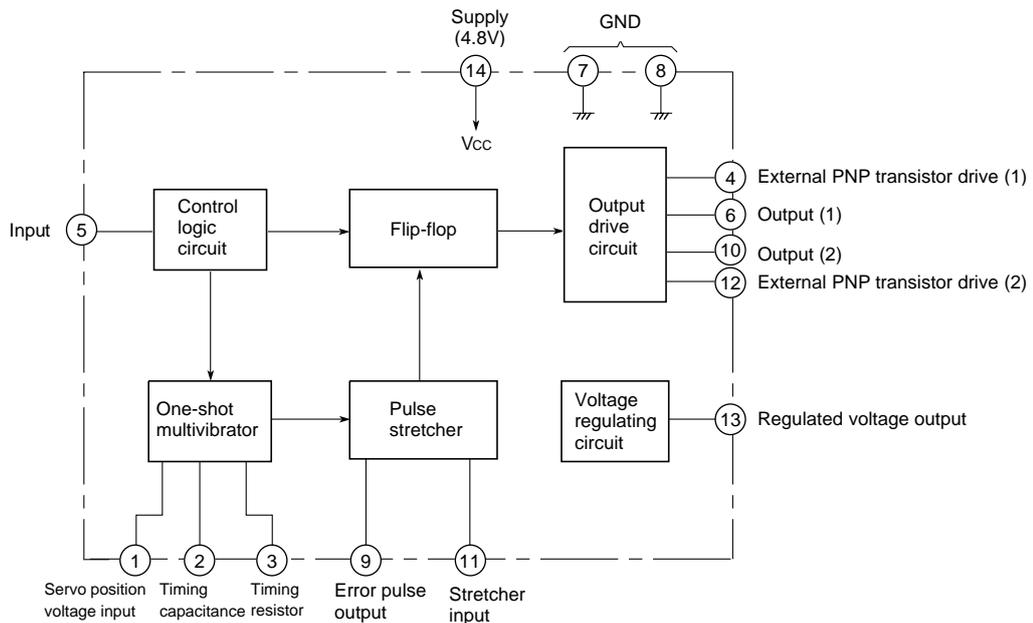
**RECOMMENDED OPERATING CONDITIONS**

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

**PIN CONFIGURATION (TOP VIEW)**



**BLOCK DIAGRAM**



SERVO MOTOR CONTROL FOR RADIO CONTROL

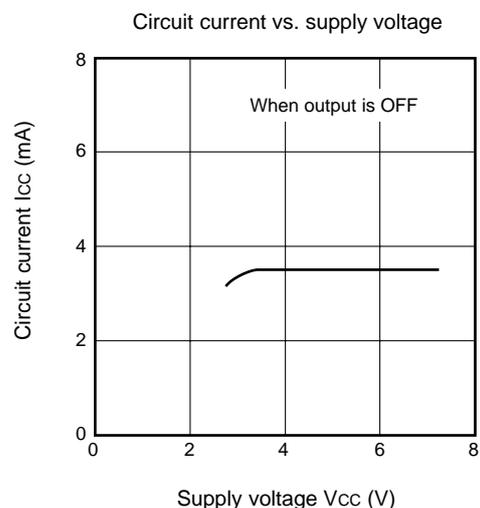
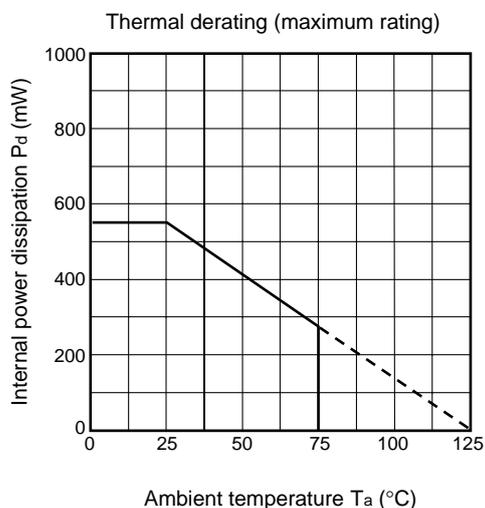
**ABSOLUTE MAXIMUM RATINGS** (Ta = 25°C, unless otherwise noted)

| 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)

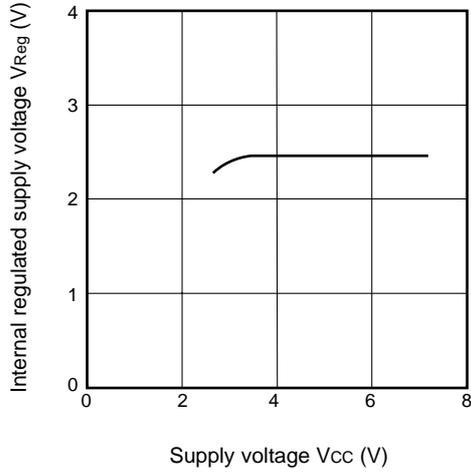
| Symbol | Parameter                                | Test conditions        | Limits |      |      | Unit |
|--------|--|------------------------|--------|------|------|------|
|        |  |                        | Min.   | Typ. | Max. |      |
| ICC    | Circuit current                          | 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)

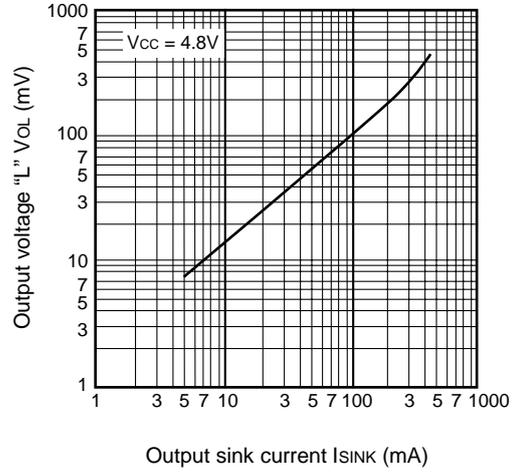


SERVO MOTOR CONTROL FOR RADIO CONTROL

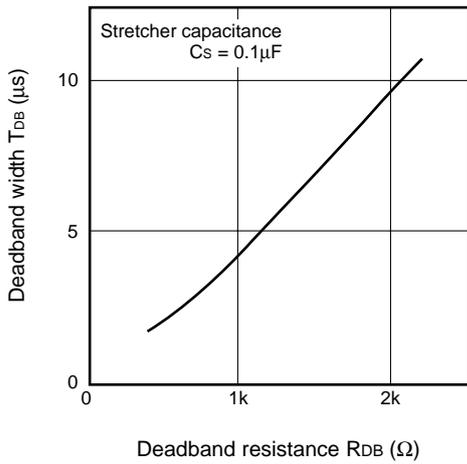
Internal regulated supply voltage vs. supply voltage



Output voltage "L" vs. output sink current

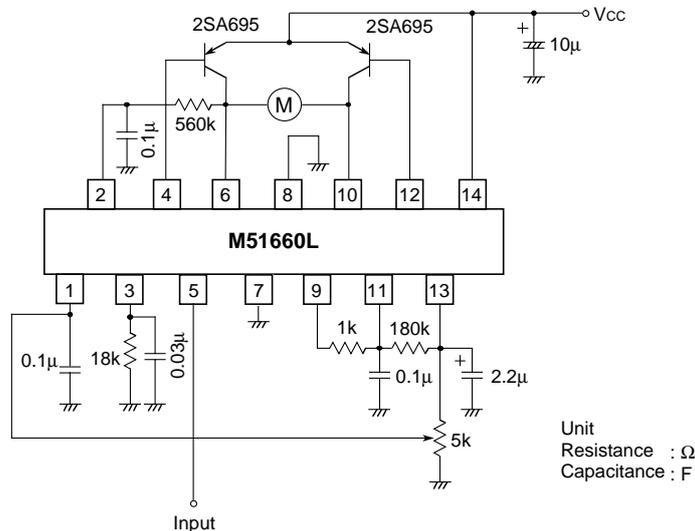


Deadband width vs. deadband resistance



**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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Datasheets for electronics components.