

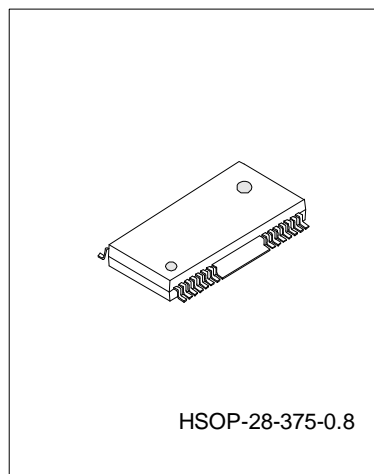
5-CHANNEL MOTOR DRIVER

DESCRIPTION

The SA9259 is a 5-channel motor driver for driving focus actuator, tracking actuator, sled motor, spindle motor and loading motor in products such as CD-PLAYER/VIDEO-CD drivers.

FEATURES

- * Wide operating supply voltage range: 6V~13.2V
- * Thermal shutdown circuit on chip
- * Built-in 5V regulator controller.
- * Level shift circuit on chip.
- * Built-in Mute mode.
- * Built-in Loading motor speed control circuit.
- * Built-in 1 phase, full-wave, linear DC motor driver.



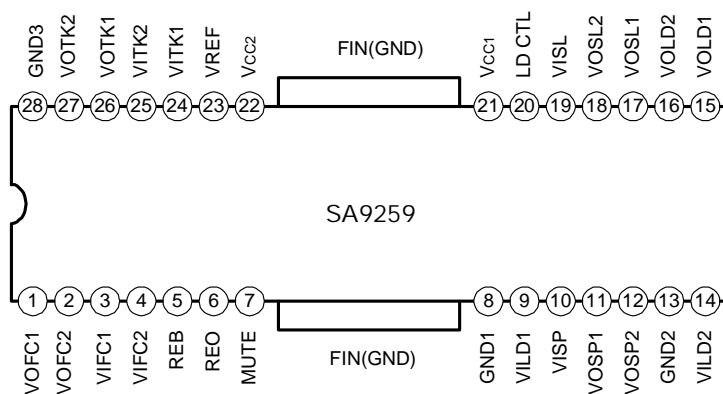
APPLICATIONS

- * CD-PLAYER
- * VIDEO-CD
- * CAR-CD

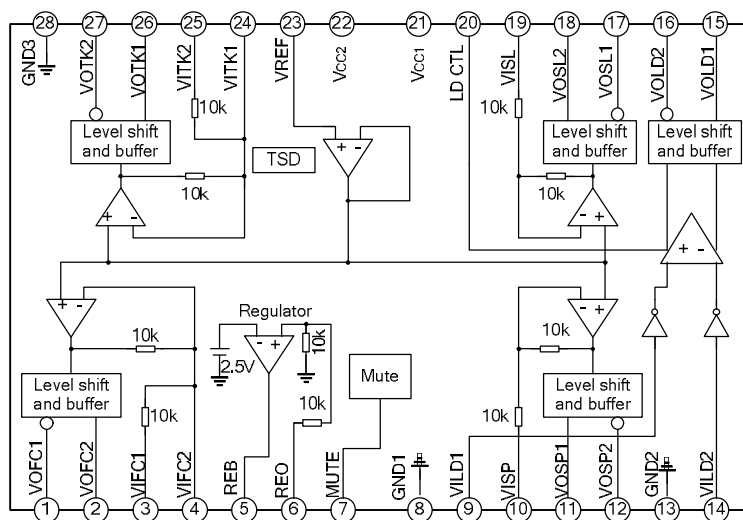
ORDERING INFORMATION

| Device | Package |
|--------|-----------------|
| SA9259 | HSOP-28-375-0.8 |

PIN CONFIGURATION



BLOCK DIAGRAM

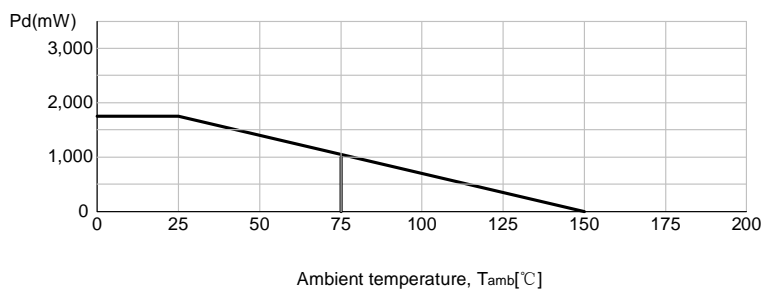


ABSOLUTE MAXIMUM RATINGS (Tamb=25°C)

| Parameter | Symbol | Rating | Unit |
|------------------------|--------|----------|------|
| Maximum supply voltage | VCCMAX | 18 | V |
| Power dissipation | PD | @1.7 | W |
| Operating temperature | TOPR | -25~+75 | °C |
| Storage temperature | TSTG | -55~+150 | °C |
| Maximum current output | IOMAX | 1 | A |

NOTE: @

- When mounted on 76mm × 114mm × 1.57mm PCB (Phenolic resin material).
- Power dissipation reduces 13.6mW / °C for using above Tamb=25°C



ELECTRICAL CHARACTERISTICS (Unless otherwise noted, $T_{amb}=25^{\circ}\text{C}$, $V_{CC}=8\text{V}$, $R_L=8\Omega$, $f=1\text{kHz}$)

| Parameter | Symbol | Test condition | Min. | Typ. | Max. | Unit |
|---|------------------|---|------|------|------|------------------|
| Operating voltage | VCC | | 6 | 8 | 14 | V |
| Quiescent current | ICCQ | Under no-load | 4.0 | 5.5 | 9.0 | mA |
| Mute-on current | IMUTE | Pin 7=GND | -- | 3.0 | 4.0 | mA |
| Mute-on voltage | VMON | -- | -- | -- | 0.7 | V |
| Mute-off voltage | VMOFF | -- | 2 | -- | -- | V |
| Regulator part | | | | | | |
| Output voltage | VREG | $I_L=100\text{mA}$ | 4.7 | 5.1 | 5.4 | V |
| Load regulation | ΔV_{RL3} | $I_L=0 \rightarrow 200\text{mA}$ | -50 | 0 | 50 | mV |
| Line regulation | ΔV_{CC} | $V_{CC}=6 \rightarrow 13\text{V}$, $I_L=100\text{mA}$ | -20 | 0 | 80 | mV |
| Driver part (except for loading motor driver) | | | | | | |
| Input offset voltage | VIO | -- | -15 | -- | 15 | mV |
| Output offset voltage1 | VOO1 | -- | -50 | -- | 50 | mV |
| Maximum source current 1 | ISOURCE1 | $R_L=8\Omega \rightarrow V_{CC}$ | 0.25 | 0.4 | -- | A |
| Maximum sink current 1 | ISINK1 | $R_L=8\Omega \rightarrow \text{GND}$ | 0.25 | 0.4 | -- | A |
| Maximum output voltage 1 | VOM1 | $V_{IN}=0\text{V}$ | 3.8 | 4.5 | -- | V |
| Maximum output voltage 2 | VOM2 | $V_{IN}=5\text{V}$ | -- | -4.5 | -3.7 | V |
| Closed-loop voltage gain | AVF | $V_{IN}=0.1\text{VRMS}$ | 5 | 6.5 | 8 | dB |
| Ripple rejection ratio | RR | $V_{IN}=0.1\text{VRMS}$, $f=120\text{Hz}$ | 40 | 60 | -- | dB |
| Slew rate | SR | 120Hz, $V_{IN}=1\text{VRMS}$, square wave | 1 | 2 | -- | V/ μs |
| LOADING MOTOR DRIVER PART (Unless otherwise specified, $V_{CTL}=\text{opened}$) | | | | | | |
| Output voltage 1 | VO1 | $V_{PIN9}=5\text{V}$, $V_{PIN14}=0\text{V}$, $R_L=45\Omega$, $V_{CTL}=3.5 \rightarrow 4.5\text{V}$ | 2.5 | 3.3 | 3.8 | V |
| Output voltage 2 | VO2 | $V_{PIN9}=0\text{V}$, $V_{PIN14}=5\text{V}$, $R_L=45\Omega$, $V_{CTL}=3.5 \rightarrow 4.5\text{V}$ | 2.5 | 3.3 | 3.8 | V |
| Output voltage regulation 1 (CTL) | VOCTL1 | $V_{CTL}=1.5 \rightarrow 2.5\text{V}$, $V_{PIN9}=5\text{V}$, $V_{PIN14}=0\text{V}$, $R_L=45\Omega$ | 0.5 | 1.0 | 1.5 | V |
| Output voltage regulation 2 (CTL) | VOCTL2 | $V_{CTL}=1.5 \rightarrow 2.5\text{V}$, $V_{PIN9}=0\text{V}$, $V_{PIN14}=5\text{V}$, $R_L=45\Omega$ | 0.5 | 1.0 | 1.5 | V |
| Load regulation 1 | ΔV_{RL1} | $I_L=100 \rightarrow 400\text{mA}$, $V_{PIN9}=5\text{V}$, $V_{PIN14}=0\text{V}$ | -- | 300 | 700 | mV |
| Load regulation 2 | ΔV_{RL2} | $I_L=100 \rightarrow 400\text{mA}$, $V_{PIN9}=0\text{V}$, $V_{PIN14}=5\text{V}$ | -- | 300 | 700 | mV |
| Output offset voltage 2 | VOO2 | $V_{PIN9}=5\text{V}$, $V_{PIN14}=5\text{V}$ | -50 | -- | 50 | mV |
| Output offset voltage 3 | VOO3 | $V_{PIN9}=0\text{V}$, $V_{PIN14}=0\text{V}$ | -50 | -- | 50 | mV |

PIN DESCRIPTION

| Pin NO. | Pin name | Pin descriptions |
|---------|----------|-------------------------------|
| 1 | VOFC1 | Focus output 1 (-) |
| 2 | VOFC2 | Focus output 2 (+) |
| 3 | VIFC1 | Focus input 1 |
| 4 | VIFC2 | Focus input 2 (Adjustable) |
| 5 | REB | Regulator base |
| 6 | REO | Regulator output, 5V |
| 7 | MUTE | Mute |
| 8 | GND1 | Ground 1 |
| 9 | VILD1 | Loading input 1 |
| 10 | VISP | Spindle input 2 |
| 11 | VOSP1 | Spindle output (+) |
| 12 | VOSP2 | Spindle output (-) |
| 13 | GND2 | Ground 2 |
| 14 | VILD2 | Loading input 2 |
| 15 | VOLD1 | Loading output 1(+) |
| 16 | VOLD2 | Loading output 2 (-) |
| 17 | VOSL1 | Sled output (-) |
| 18 | VOSL2 | Sled output (+) |
| 19 | VISL | Sled input |
| 20 | LD CTL | Loading motor speed control |
| 21 | VCC1 | Supply voltage 1 |
| 22 | VCC2 | Supply voltage 2 |
| 23 | VREF | 2.5V bias |
| 24 | VITK1 | Tracking input 1 (Adjustable) |
| 25 | VITK2 | Tracking input 2 |
| 26 | VOTK1 | Tracking output 1 (+) |
| 27 | VOTK2 | Tracking output 2 (-) |
| 28 | GND3 | Ground 3 |

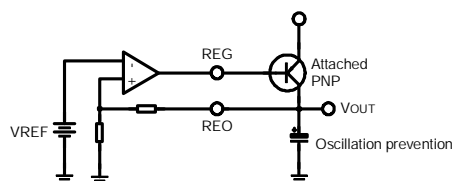
FUNCTION DESCRIPTIONS

1. MUTE

- This IC has a built in thermal shutdown circuit that mutes the output current when the chip temperature reaches 175°C (typ.). The hysteresis is set to 25°C (typ.), so the driver circuits start up again when the chip temperature falls to 150°C (typ.).
- The mute circuit logic is active low.
- The circuit is muted during thermal shutdown and during the mute-on state .In each case, only the drivers are muted. The output pins remain at the internal bias voltage, roughly $(V_{cc} - V_{be}) / 2$.
- Bias pin (pin23) should be pulled up to more than 1.6V. In case the bias pin voltage is pulled down below 1.4V (Typ), the output current is muted.

2. Regulator

This is a typical series regulator that generates a reference voltage internally. A PNP low saturation type transistor must be connected.

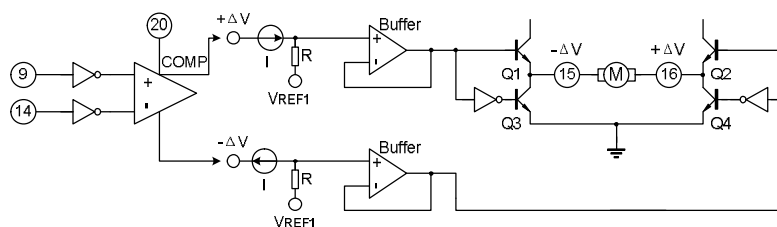


- VREF BG is the output voltage of the bandgap standard bias circuit and is also the standard voltage of the regulator.
- Periphery circuit is composed of bipolar, KSB722 and one 100μF capacitor. The capacitor needs good temperature characteristics to remove the ripple.
- The output voltage VOUT is decided by the following formula:

$$V_{OUT} = V_{REF\ BG} (R_2 + R_3) / R_3 = 2.5 \times 2 = 5V$$

$$R_2 = R_3$$

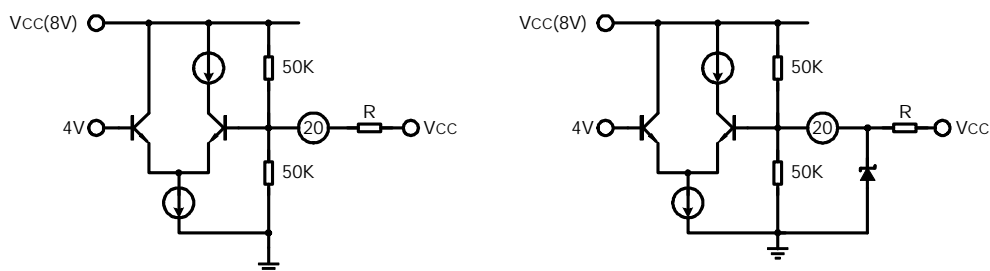
3. LOADING MOTOR DRIVER



- Input voltage (5V and 0V) or (0V and 5V) to pin 9 and pin 14.
- After input the voltage to pin 9 and pin 14, decide the output of comparator according to the voltage state.
- As the above figure, the voltage warp ΔV , $[V_{REF1} + (I \times R)] - [V_{REF1} - (I \times R)]$, used for the motor. And the direction of the motor is decided by the voltage warp $+\Delta V$ and $-\Delta V$.
- The output characteristics are as follows:

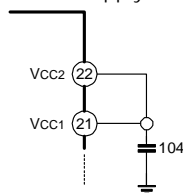
| FWD(pin9) | REV(pin14) | VOTR+(pin15) | VOTR-(pin16) | Function |
|-----------|------------|-------------------------|-------------------------|--------------|
| L | L | $(V_{CC} - V_{be}) / 2$ | $(V_{CC} - V_{be}) / 2$ | Stop mode |
| L | H | L | H | Reverse mode |
| H | L | H | L | Forward mode |
| H | H | $(V_{CC} - V_{be}) / 2$ | $(V_{CC} - V_{be}) / 2$ | Stop mode |

4. LOADING MOTOR SPEED CONTROL



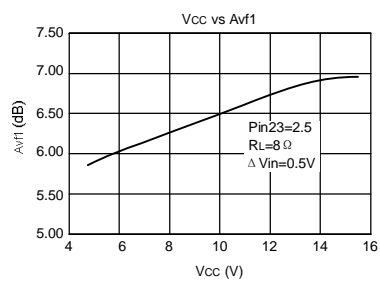
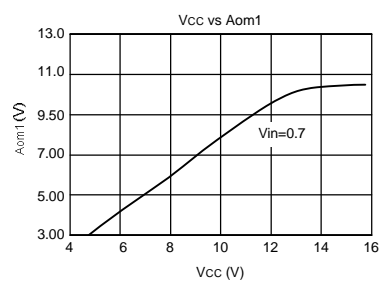
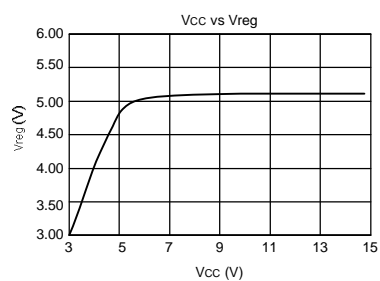
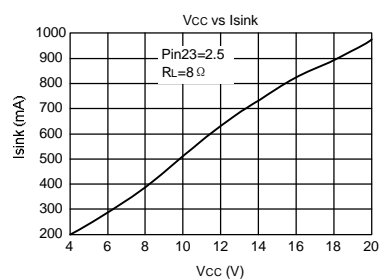
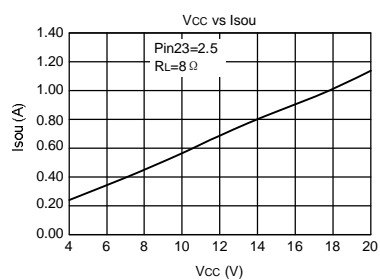
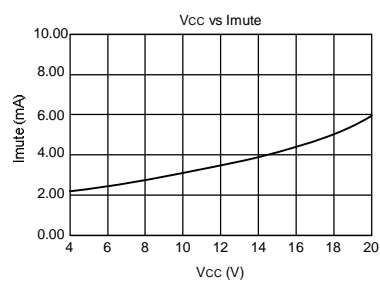
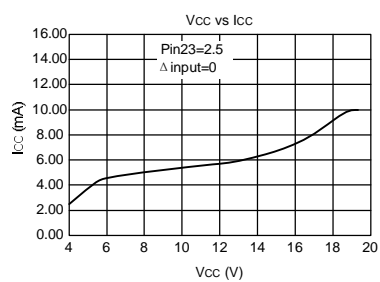
- If the torque of the loading motor is too low when it is used with the pin #20 open, then it should be used as the above diagram.
- The desired torque could be obtained by selecting the appropriate resistor R as shown in the left diagram.
- If it is necessary, the zener diode can be used as in the right diagram.
- The maximum torque is obtained when the applied voltage at pin #20 is about 6.8V (at $V_{CC}=8V$).

5. Connect a by-pass capacitor, 0.1 μ F between the supply voltage source.

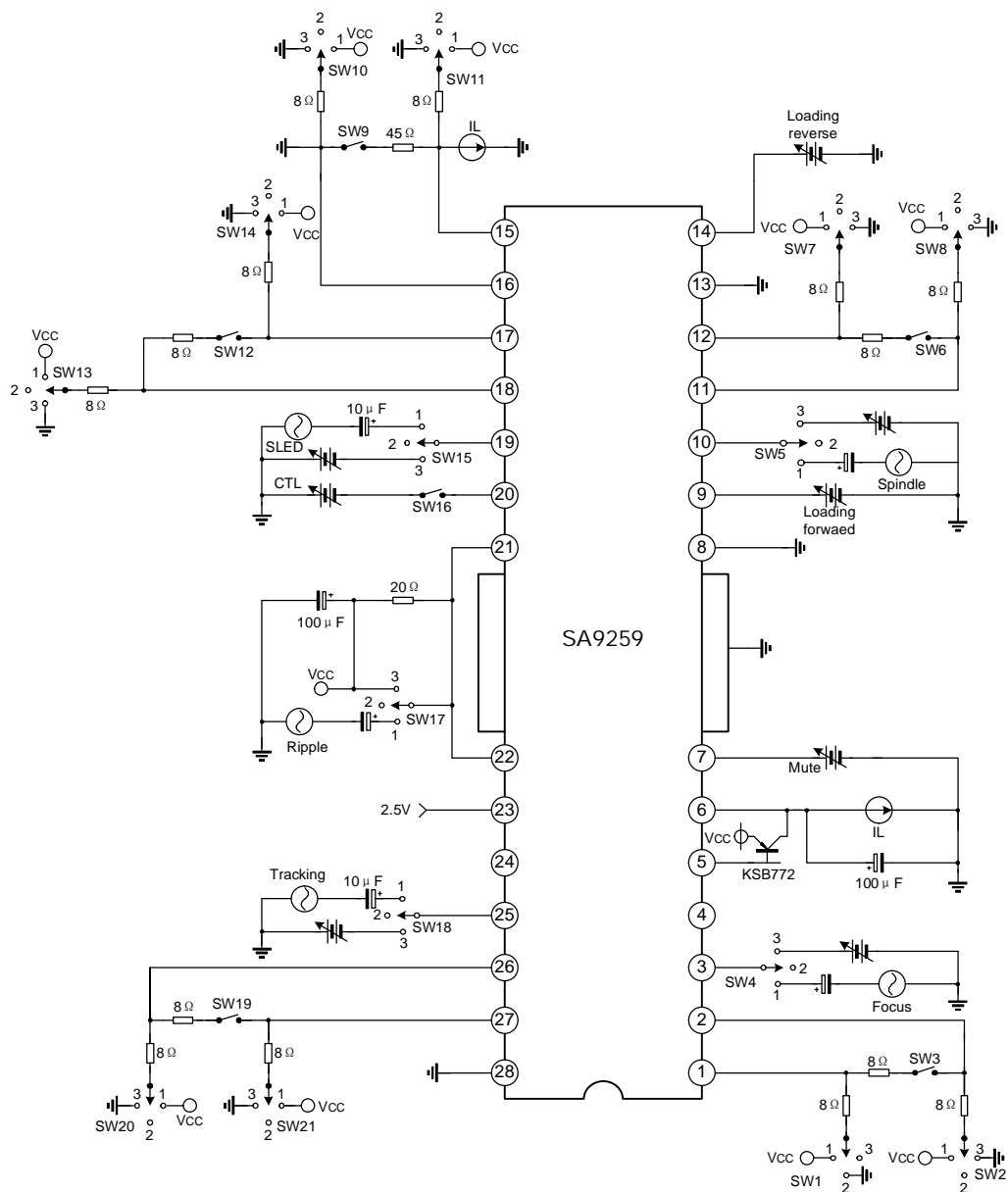


6. Radiation fin is connecting to the internal GND of the package.
Connect the fin to the external GND.

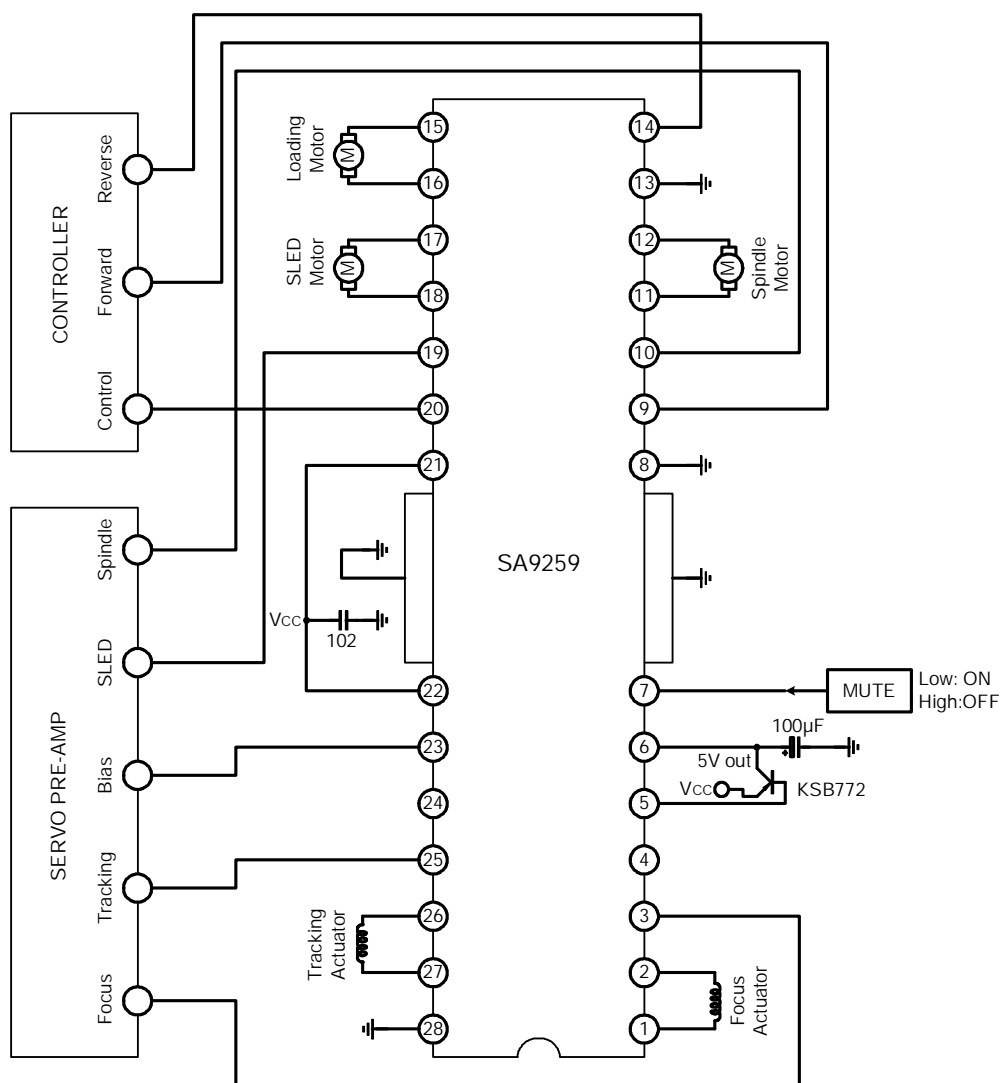
ELECTRICAL CHARACTERISTICS CURVES



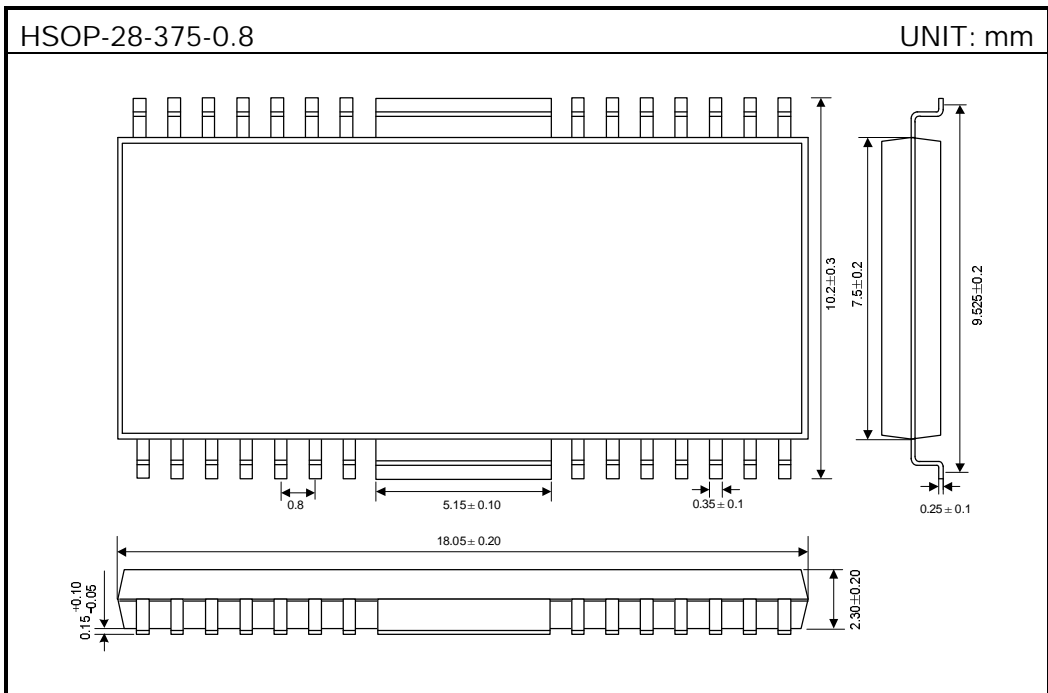
TEST CIRCUIT



TYPICAL APPLICATION CIRCUIT



PACKAGE OUTLINE





Attachment

Revision History

| Data | REV | Description | Page |
|------------|-----|---|------|
| 2003.01.08 | 1.0 | Original | |
| 2005.12.22 | 1.1 | Modify the "BLOCK DIAGRAM" and "ELECTRICAL CHARACTERISTICS" | |