4-CHANNEL MOTOR DRIVER IC AZ9258

General Description

The AZ9258 is a monolithic integrated circuit, and suitable for 4-channel motor driver which drives focus actuator, tracking actuator, sled motor and loading motor of VCD system.

This motor driver IC is available in standard HSOP-28 Package.

Features

- 1 Phase, Full-Wave, Linear DC Motor Driver
- Output Gain Adjustable
- Built-in Op Amp
- Built-in Level Shift Circuit
- Built-in Mute Circuit
- Built-in TSD (Thermal Shutdown) Circuit
- Wide Operating Supply Voltage Range: 6V to 13.2V

Application

- Video Compact Disk Player (VCD)

HSOP-28

Figure 1. Package Type of AZ9258

Pin Configuration

M Package
(HSOP-28)

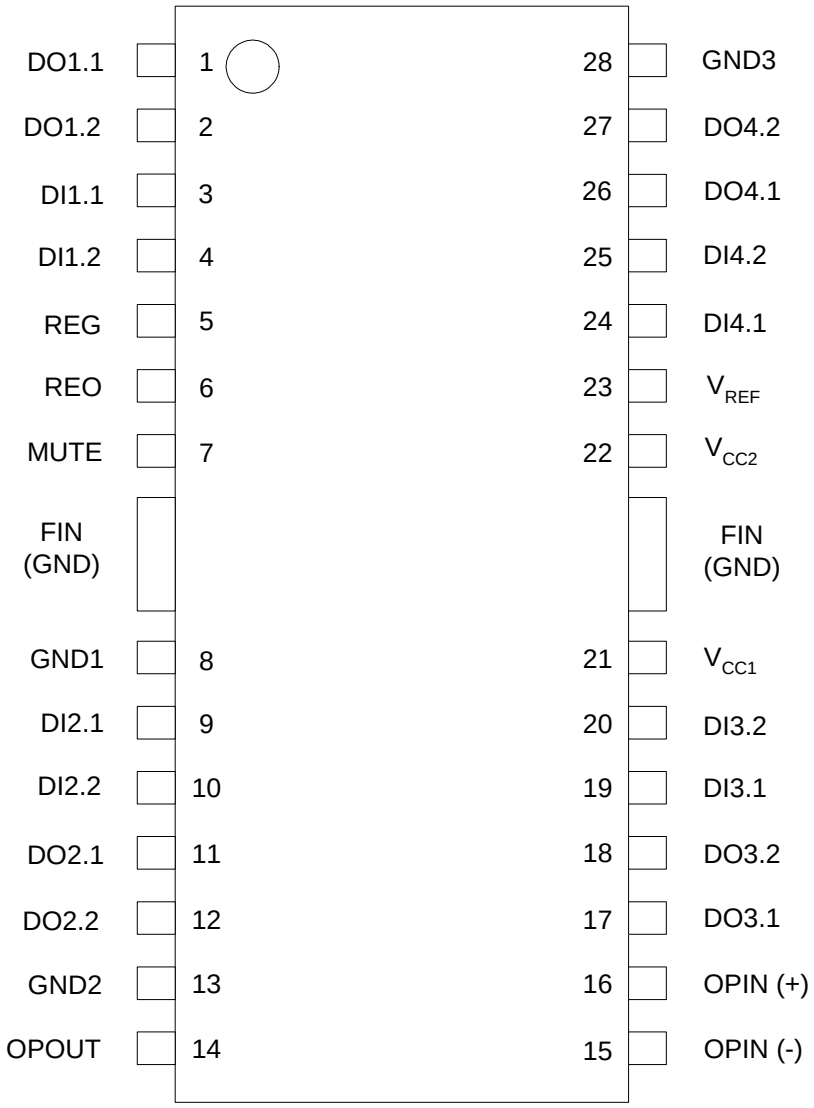


Figure 2. Pin Configuration of AZ9258 (Top View)

Pin Description

Pin Number	Pin Name	Function
1	DO1.1	Focus output (-)
2	DO1.2	Focus output (+)
3	DI1.1	Focus input
4	DI1.2	Focus input (adjustable)
5	REG	Regulator bias
6	REO	Regulator output
7	MUTE	Mute
8	GND1	Ground 1
9	DI2.1	Spindle input (adjustable)
10	DI2.2	Spindle input
11	DO2.1	Spindle output (+)
12	DO2.2	Spindle output (-)
13	GND2	Ground 2
14	OPOUT	Op Amp output
15	OPIN (-)	Op Amp input (-)
16	OPIN (+)	Op Amp input (+)
17	DO3.1	Sled output (-)
18	DO3.2	Sled output (+)
19	DI3.1	Sled input
20	DI3.2	Sled input (adjustable)
21	V_{CC1}	Supply voltage 1
22	V_{CC2}	Supply voltage 2
23	V_{REF}	2.5V bias
24	DI4.1	Tracking input (adjustable)
25	DI4.2	Tracking input
26	DO4.1	Tracking output (+)
27	DO4.2	Tracking output (-)
28	GND3	Ground 3

Functional Block Diagram

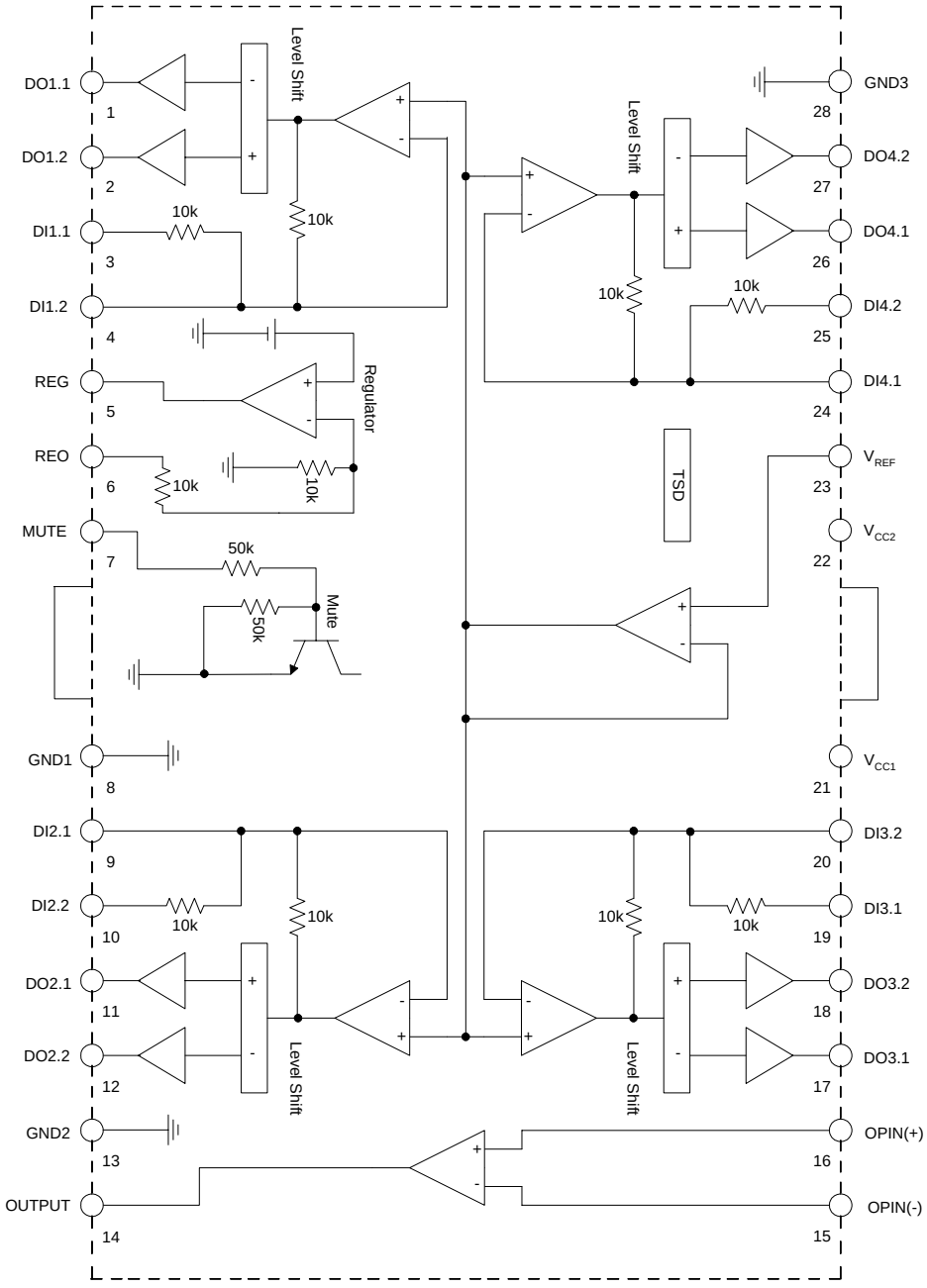
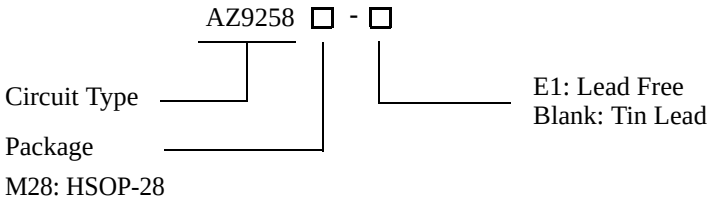


Figure 3. Functional Block Diagram of AZ9258

Ordering Information



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Tin Lead	Lead Free	Tin Lead	Lead Free	
HSOP-28	0 to 70°C	AZ9258M28	AZ9258M28-E1	AZ9258M28	AZ9258M28-E1	Tube

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	18	V
Driver Output Current	I_O	1	A
Power Dissipation	P_D	1.7 (Note 2)	W
Storage Temperature Range	T_{STG}	-55 to 150	°C

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Note 2: The Power dissipation is reduced by 13.6mW for each increase in T_A of 1°C over 25°C.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	6	13.2	V
Operating Temperature	T_A	0	70	°C

Electrical Characteristics

(T_A=25°C, V_{CC}=8V, R_L=8Ω, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Quiescent Circuit Current	I_{CC}	V_{IN}=0	5.5	9	13.5	mA
Regulator Part						
Output Voltage	V_{REG}	I_L=100mA	4.75	5	5.25	V
Load Regulation	ΔV_{RL}	I_L=0 to 200mA	-40	0	10	mV
Line Regulation	ΔV_{CC}	V_{CC}=6 to 9V, I_L=200mA	-10	0	20	mV
Driver Part						
Input Offset Voltage	V_{IO}		-5		+5	mV
Output Offset Voltage	V_{OO}		-30		30	mV
Max Source Current	I_{SOURCE}	R_L=4Ω, V_{CC}	0.5	0.8		A
Max Sink Current	I_{SINK}	R_L=4Ω, GND	0.5	1		A
Max Output Voltage	V_{OM}	V_{IN}=2 $V_{RMS,}$ 1kHz	2.5	3.2		V
Closed-Loop Voltage Gain	A_{VF}	V_{IN}=0.1 $V_{RMS,}$ 1kHz	4.5	6.5	7.5	dB
Ripple Rejection Ratio	RR	V_{IN}= -20dB, 120Hz	60	80		dB
Slew Rate	SR	100Hz, square wave	1	6		V/μs
Op Amp Part						
Input Offset Voltage 1	V_{IO1}		-5		+5	mV
Input Bias Current	I_{IB}				300	nA
High Level Output Voltage	V_{OH}		6			V
Low Level Output Voltage	V_{OL}				1.8	V
Output Source Current 1	$I_{SOURCE1}$	R_L=50Ω, V_{CC}	10	40		mA
Output Sink Current 1	I_{SINK1}	R_L=50Ω, GND	10	40		mA
Open-Loop Voltage Gain	G_{VO}	V_{IN}=-75dB, 1kHz	65	78		dB
Ripple Rejection Ratio 1	RR1	V_{IN}=-20dB, 120Hz	50	70		dB
Slew Rate 1	SR1	Square, V_{OUT}=2V_{P-P} , 100Hz	0.5	1		V/μs
Common Mode Rejection Ratio	CMRR	V_{IN}=-20dB, 1kHz	70	84		dB

Equivalent Circuits

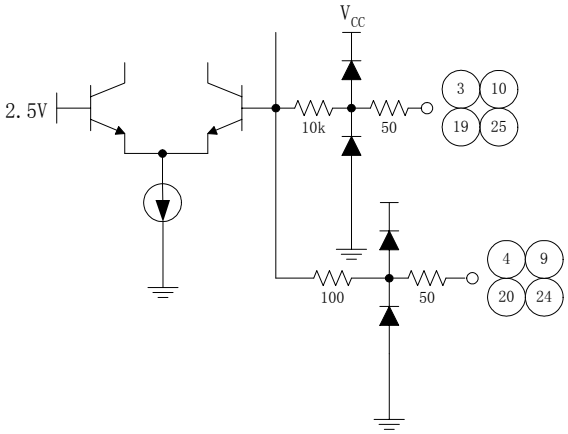


Figure 4. Driver Input

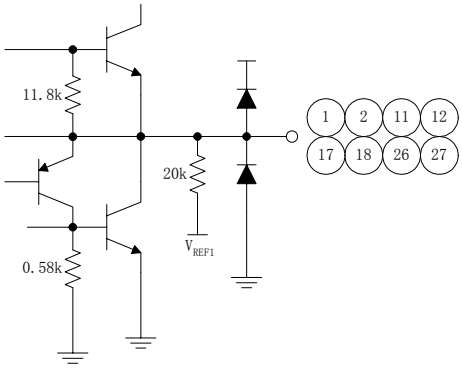


Figure 5. Driver Output

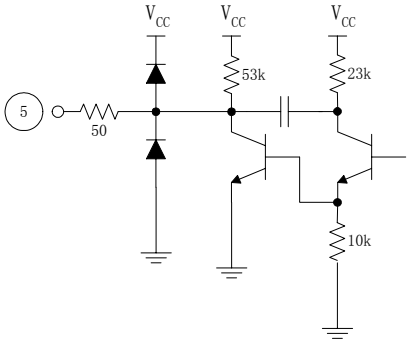


Figure 6. Regulator

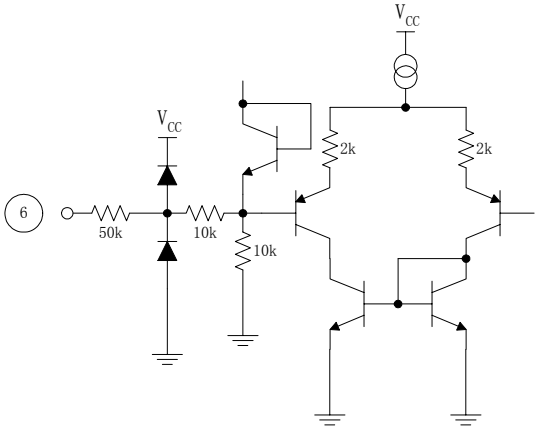


Figure 7. Regulator Output

Equivalent Circuits (Continued)

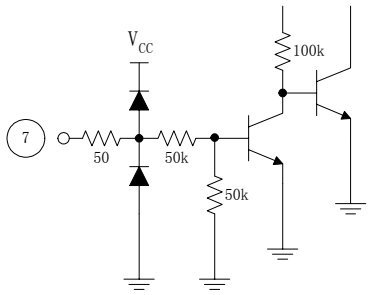


Figure 8. Mute Input

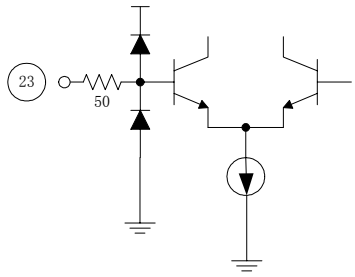


Figure 9. Bias Input

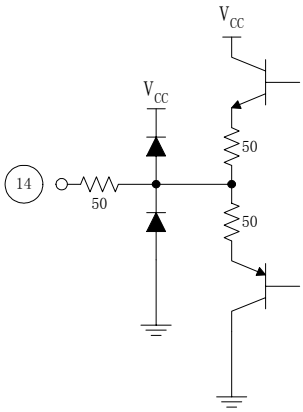


Figure 10. Op Amp Output

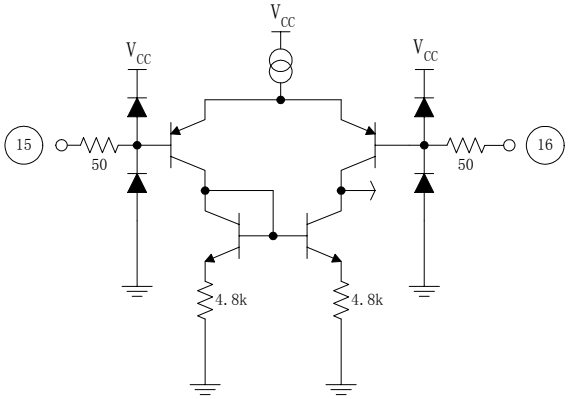


Figure 11. Op Amp Input

Typical Performance Characteristics

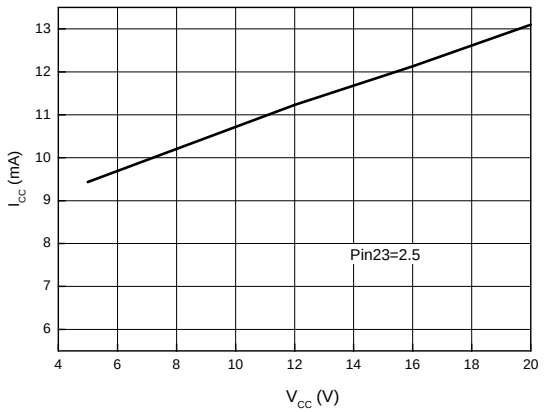


Figure 12. V_{CC} vs. I_{CC}

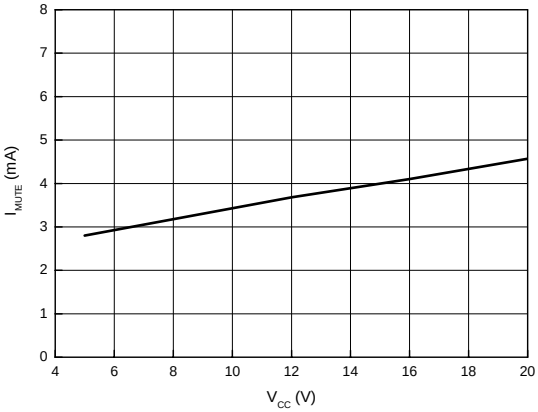


Figure 13. V_{CC} vs. I_{MUTE}

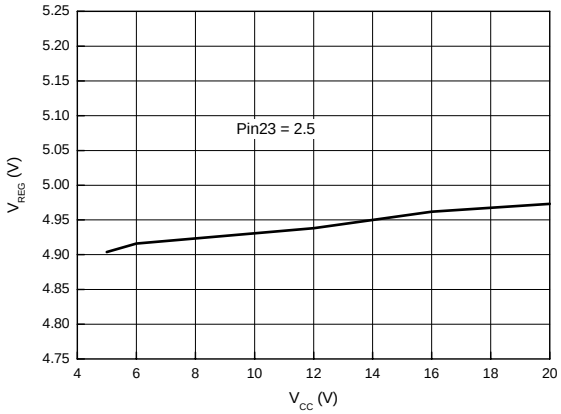


Figure 14. V_{CC} vs. V_{REG}

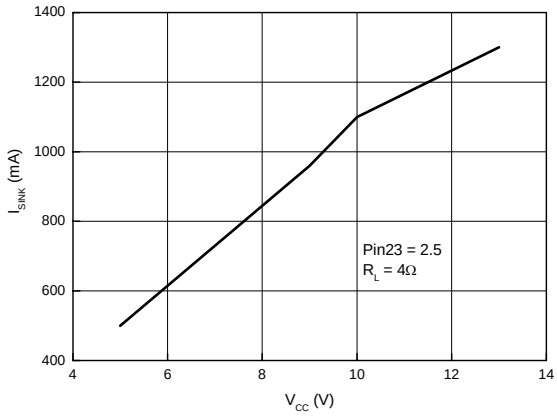


Figure 15. V_{CC} vs. I_{SINK}

Typical Performance Characteristics (Continued)

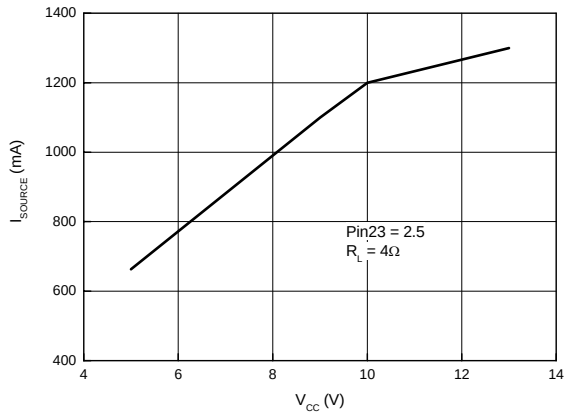


Figure 16. V_{CC} vs. I_{SOURCE}

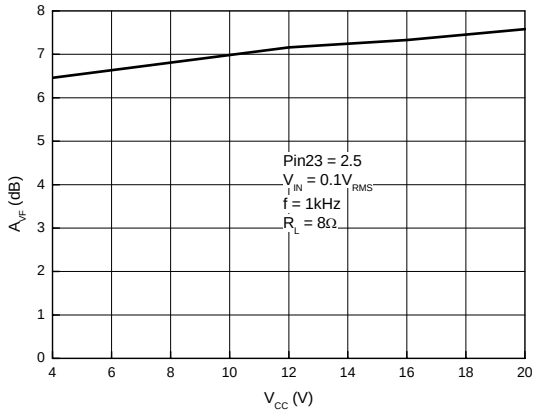


Figure 17. V_{CC} vs. A_{VF}

Test Circuit

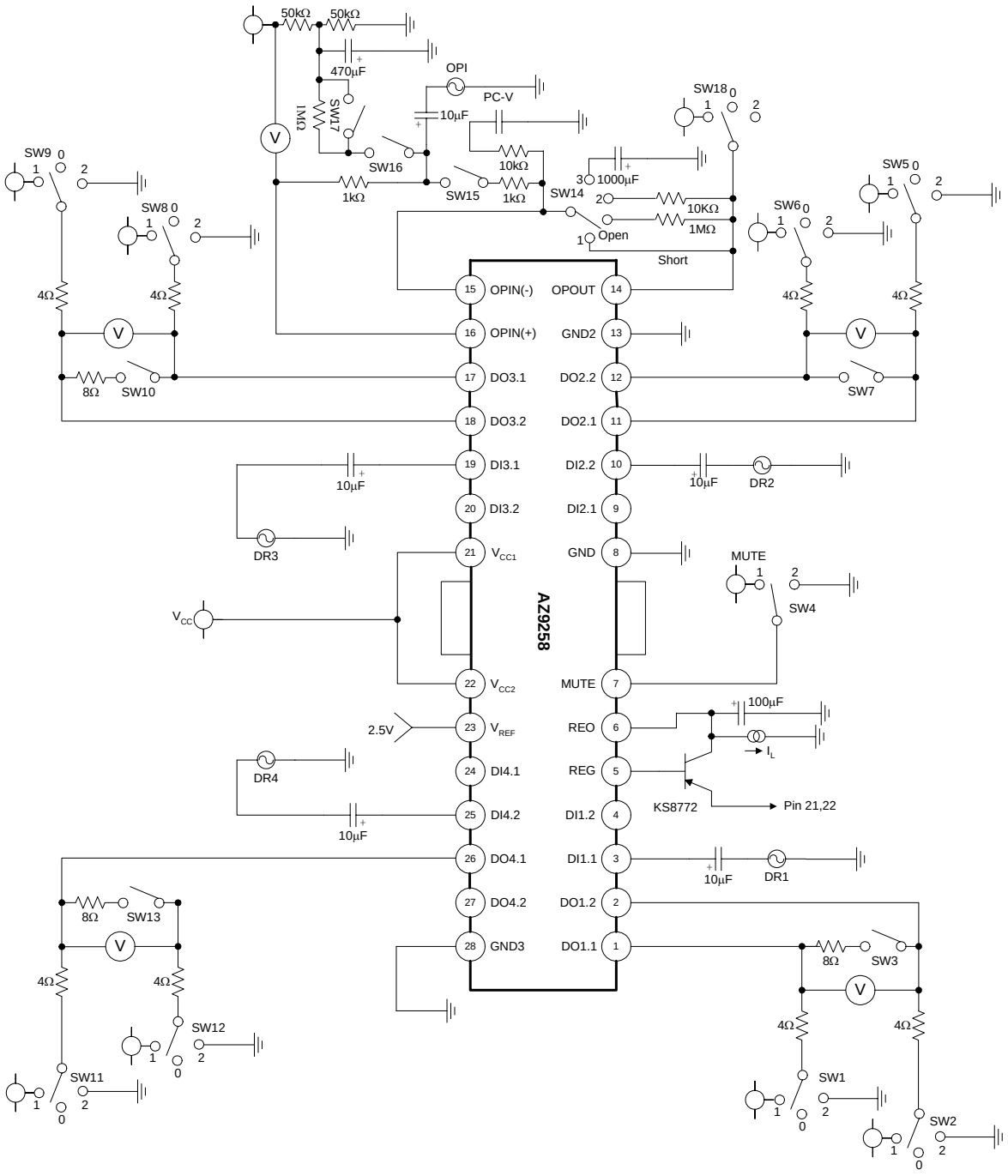


Figure 18. Test Circuit Diagram of AZ9258

Typical Application

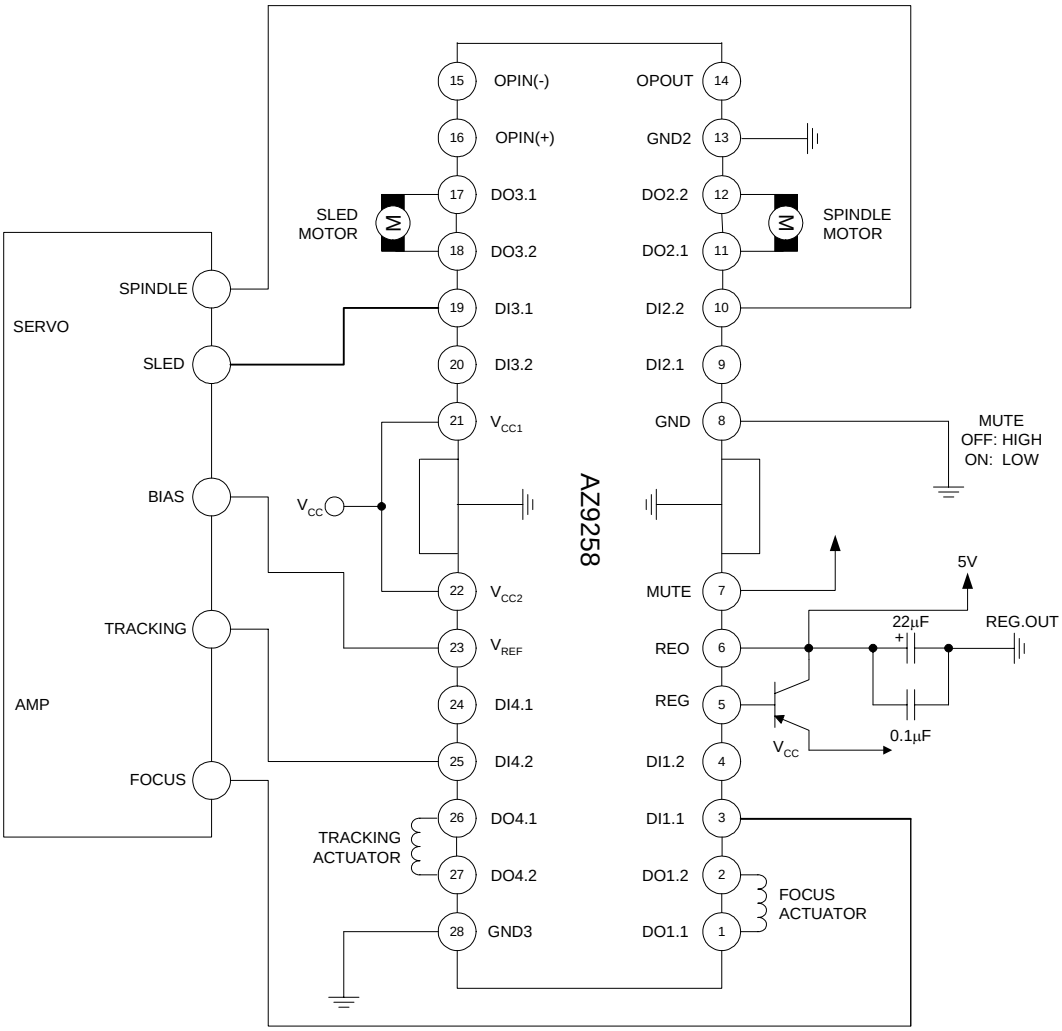


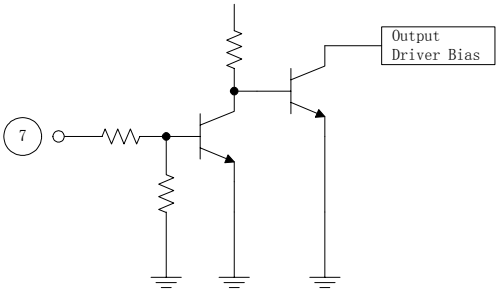
Figure 19. Typical Application of AZ9258 in Video Compact Disk Player

Application Information

1. Mute

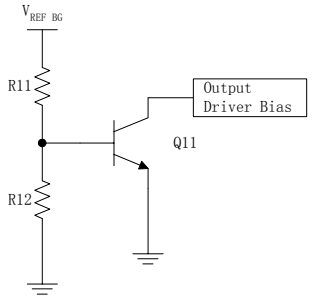
Pin 7	Mute Circuit
High	Turn-off
Low	Turn-on
Open	Turn-on

- When the mute pin 7 is open or the voltage of the mute pin 7 is below 0.5V, the mute circuit is activated so that the output circuit will be muted.
- When the voltage of the mute pin is above 2V, the mute circuit is disabled and the output circuit operates normally.
- If the chip temperature rises above 175°C, then the TSD (Thermal shutdown) circuit is activated and the output circuit is muted.



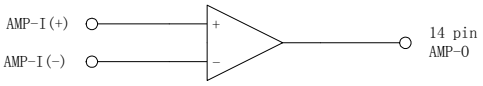
2. Thermal Hysteresis Shutdown

- The $V_{REF\ BG}$ is the output voltage of the band-gap-referenced biasing circuit and acts as the input voltage of the TSD circuit.
- The base-emitter voltage of the TR, Q11 is designed to turn-on at below voltage.
  $V_{BE}=V_{REF\ BG}XR12/(R11+R12)=460mV$
- When the chip temperature rises up to 175°C, then the turn-on voltage of the Q11 would drop down to 460mV. Hence, the Q11 would turn on so the output circuit will be muted. But when the temperature fall to 150°C, the Q11 will turn-off again and the output will operate normally.



3. Op Amp

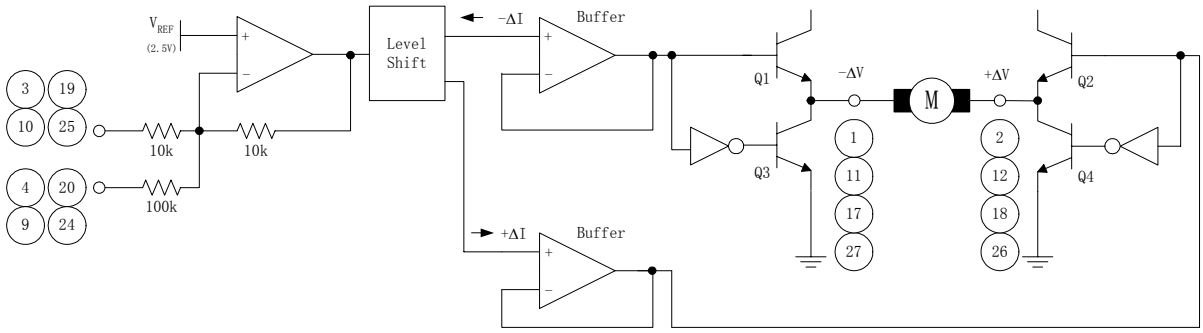
- Op Amp is integrated in the IC for user's convenience.



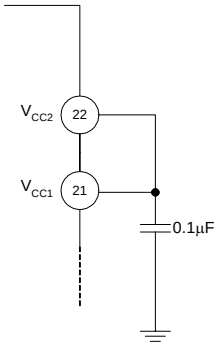
4. Driver

- The voltage, V_{REF}, is the reference voltage given by the bias voltage of the pin23.
- The input signal through the pin3 is amplified by 10k/10k times and then fed to the level shift.
- The level shift produces the current due to the difference between the input signal and the arbitrary reference signal. The current produced as $+\Delta I$ and $-\Delta I$ is fed into the driver buffer.
- Driver Buffer operates the power transistor of the output stage according to the state of the input signal.
- The output stage is the BTL Driver and the motor is rotating in forward direction by operating transistor Q1 and transistor Q4. On the other hand, if transistor Q2 and transistor Q3 is operating, the motor is rotating in reverse direction.
- When the input voltage through the pin3 is below the V_{REF}, then the direction of the motor in forward direction.
- When the input voltage through the pin3 is above the V_{REF}, then the direction of the motor in reverse direction.
- If it is desired to change the gain, then the pin4 or pin24 can be used.

Application Information (Continued)



5. Connect a bypass capacitor of 0.1μF between the supply voltage sources and the ground to stabilize the input supply voltage.

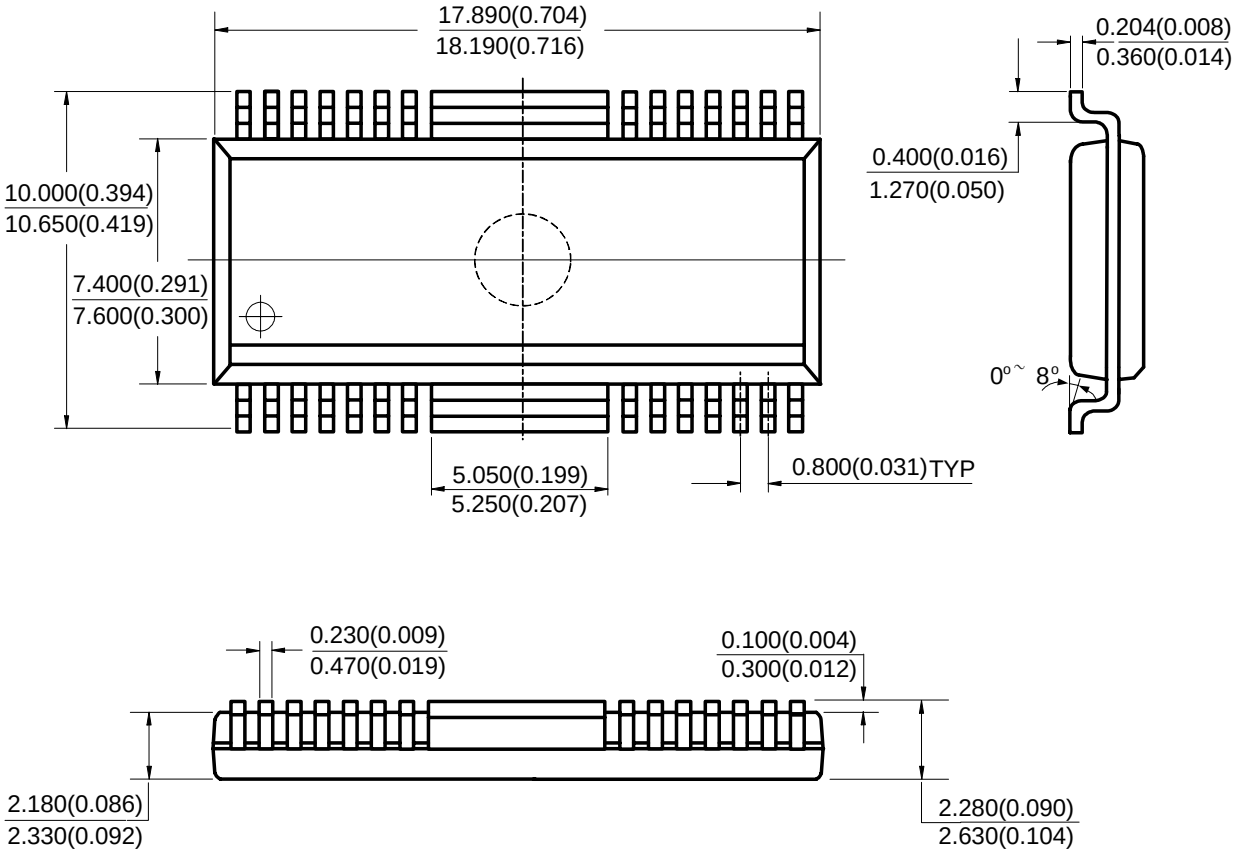


6. Radiation fin is connecting to the internal GND of the package.

Connect the fin to the external GND.

Mechanical Dimensions

HSOP-28 **Unit: mm(inch)**



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