

**Features**

- External resistor allows gain adjustment
- Built in general-purpose OP-amp
- Built in mute function
- Built in 5V regulator.(with external PNP Tr.)
- Built in thermal shutdown circuit
- Operating range 6~13.2V

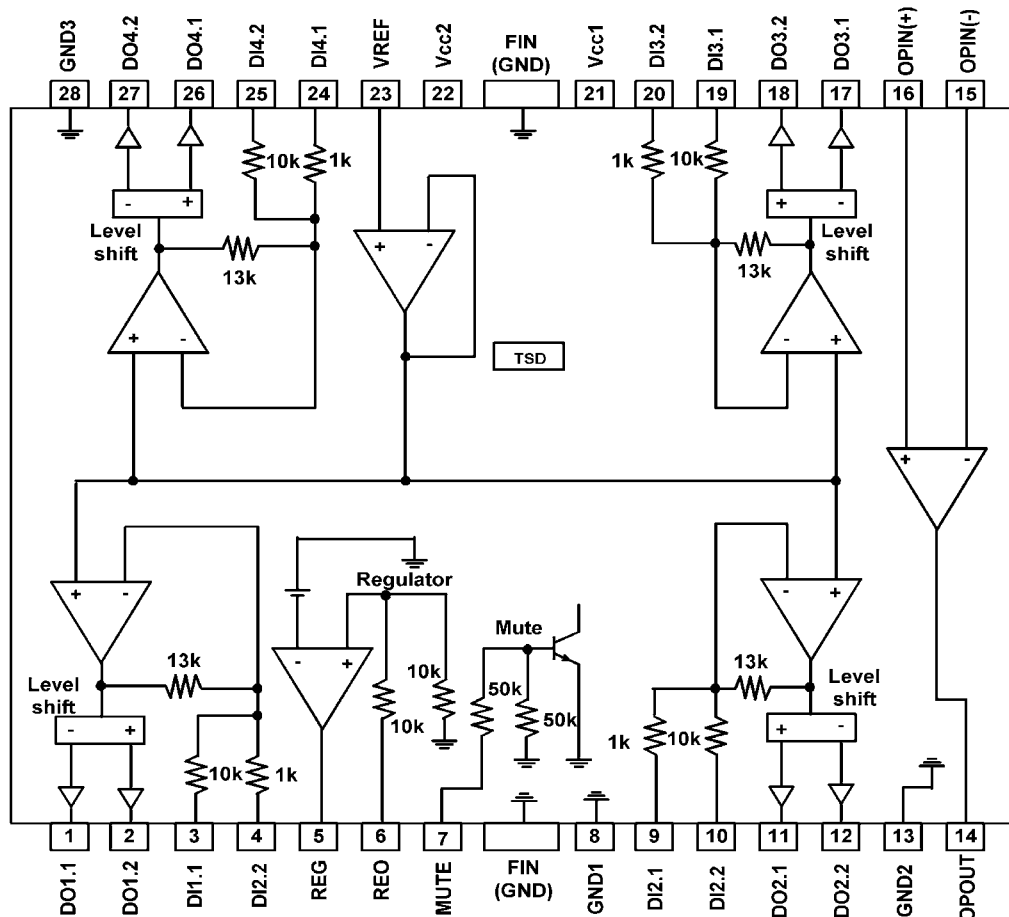
**General Description**

The AT5658 is a 4-ch BTL driver for driving tracking actuator, focus actuator, sled motor and loading motor of CD/CD-ROM/DVD system, and can also drive spindle motor of CD system. With built-in 5V regulator and general-purpose op amp, it support a variety of application.

**Applications**

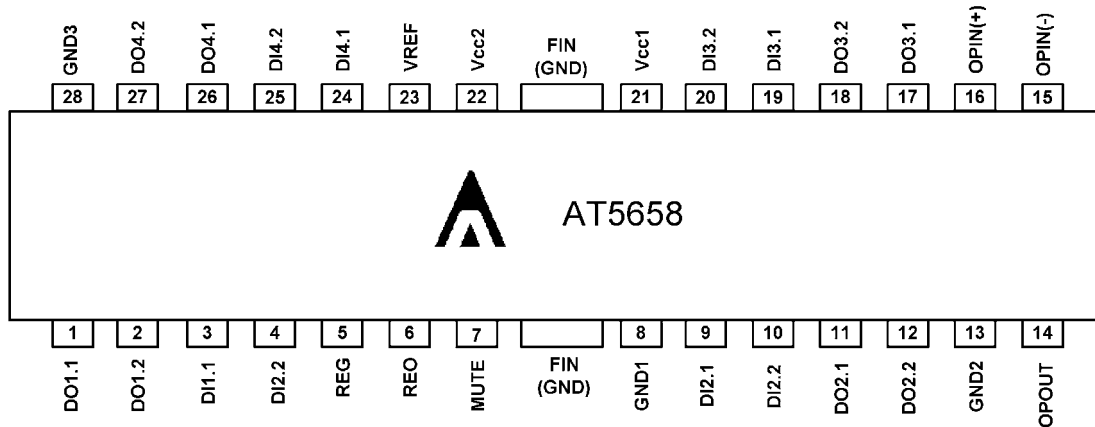
- Compact disk player (CDP)
- Video compact disk player (VCD)
- Automotive compact disk player

**Block Diagram**



**Aimtron reserves the right without notice to change this circuitry and specifications.**

### Pin Configuration



### Ordering Information

Part number	Package	Marking
AT5658H	28-pin HSOP	AT5658H

### Pin Description

Pin No.	Symbol	Descript	Pin No	Symbol	Descript
1	DO1.1	CH1 output (-)	15	OPIN(-)	Op-amp input (-)
2	DO1.2	CH1 output (+)	16	OPIN(+)	Op-amp input (+)
3	DI1.1	CH1 input 1	17	DO3.1	CH3 output (-)
4	DI1.2	CH1 input 2	18	DO3.2	CH3 output (+)
5	REG	Regulator base	19	DI3.1	CH3 input 1
6	REO	Regulator output, 5V	20	DI3.2	CH3 input 2
7	MUTE	Mute	21	V <sub>CC1</sub>	Supply voltage 1
8	GND1	Ground 1	22	V <sub>CC2</sub>	Supply Voltage 2
9	DI2.1	CH2 input 1	23	VREF	CH bias input
10	DI2.2	CH2 input 2	24	DI4.1	CH4 input 1
11	DO2.1	CH2 output (+)	25	DI4.2	CH4 input 2
12	DO2.2	CH2 output (-)	26	DO4.1	CH4 output (+)
13	GND2	Ground 2	27	DO4.2	CH4 output (-)
14	OPOUT	Op-amp output	28	GND3	Ground 3

**Absolute Maximum Ratings**

(Ta=+25°C)

Parameter	Symbol	Limits	Unit
Maximum supply voltage	V <sub>CCMAX</sub>	13.5	V
Power dissipation	P <sub>D</sub>	1.7 *1	W
Storage temperature	T <sub>STG</sub>	-55~+150	°C

NOTE:\*1

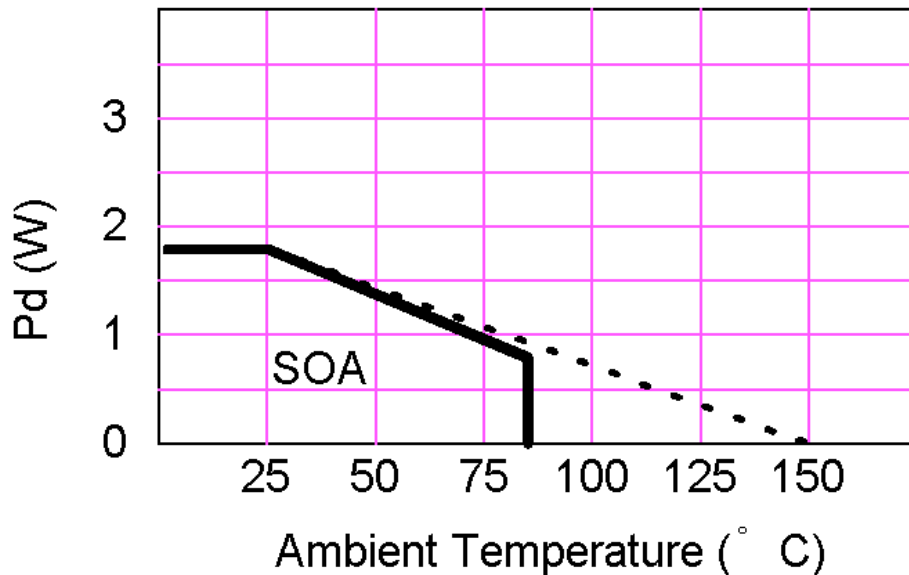
1. Use base condition:100x100mm, t=1.6mm, copper leaf 50%, glass epoxy mounting.
2. Derating is done at 13.6mW/°C for operation above Ta=25°C

**Recommended Operating Conditions**

(Ta=+25°C)

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Operatong supply voltage	V <sub>CC</sub>	5.5	—	13.2	V
Operational voltage	T <sub>OPR</sub>	-35	—	+85	°C

**Power Dissipation (Ta = 25°C)**



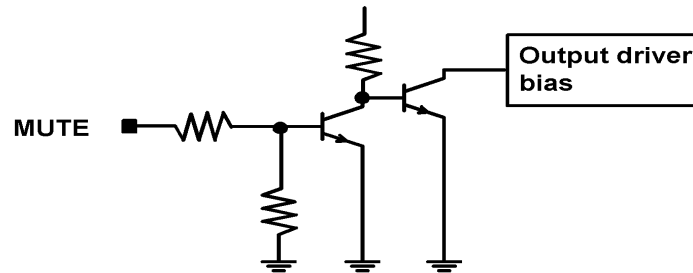
### Electrical Characteristics

(unless otherwise noted,  $T_a=25^{\circ}\text{C}$ ,  $V_{cc1}=V_{cc2}=8\text{V}$ ,  $R_L=8\Omega$ , and  $f=1\text{kHz}$ )

Parameter	Symbol	Condition	Values			Unit	
			Min.	Typ.	Max.		
BTL Driver	Quiescent circuit current	$I_{CCQ}$	Under no-load	5.5	8.0	10.5	mA
	Output voltage offset	$V_{OO}$	--	-40	--	40	mV
	Output voltage "H"	$V_{OHD}$	--	5.2	5.6	--	V
	Output voltage "L"	$V_{OLD}$	--	--	1.3	1.55	V
	Gain (Close circuit)	$G_{VC}$	$V_{IN}=0.1\text{Vrms}$ , $f=1\text{kHz}$	7.0	8.0	9.0	dB
	Ripple rejection	RR	$V_{IN}=0.1\text{Vrms}$ , $f=100\text{Hz}$	--	60	--	dB
	Slew rate	SR	$V_{OUT}=3\text{Vp-p}$ square wave, $f=100\text{kHz}$	--	2.0	--	V/ $\mu\text{S}$
Mute-off voltage	$V_{MOFF}$	--	2.0	--	--	V	
Regulator	Output voltage	$V_{REG}$	$I_L=100\text{mA}$	4.75	5.0	5.25	V
	Load regulation	$\Delta V_{RL}$	$I_L=0\sim 200\text{mA}$	-40	0	10	mV
	Line regulation	$\Delta V_{CC}$	$V_{CC}=6\sim 9\text{V}$ , $I_L=100\text{mA}$	-10	0	25	mV
Op-amp	Offset voltage	$V_{OFOP}$	--	-5	0	5	mV
	Input bias current	$I_{BOP}$	--	--	20	300	nA
	"H" level output voltage	$V_{OHOP}$	--	6.0	--	--	V
	"L" level output voltage	$V_{OLOP}$	--	--	--	1.8	V
	Output drive current (sink)	$I_{SINK}$	$50\Omega$ , at $V_{CC}$	10	50	--	mA
	Output drive current (source)	$I_{SOURCE}$	$50\Omega$ , at ground	10	40	--	mA
	Voltage gain (open circuit)	$G_{VO}$	$V_{IN}=75\text{dBV}$ , $f=1\text{kHz}$	--	78	--	dB
	Slew rate	$SR_{OP}$	$V_{OUT}=4\text{Vp-p}$ square wave, $f=100\text{kHz}$	--	1	--	V/ $\mu\text{S}$
	Ripple rejection	$RR_{OP}$	$V_{IN}=-20\text{dBV}$ , $f=100\text{kHz}$	--	65	--	dB
Common mode rejection ratio	CMRR	$V_{IN}=-20\text{dBV}$ , $f=1\text{kHz}$	70	84	--	dB	

## Application Information

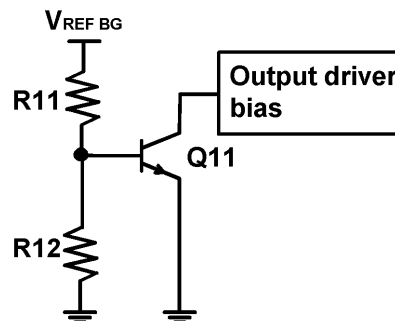
### 1. Mute



MUTE	Mute circuit
High(>2.0V)	Turn-OFF
Low(<0.5V)	Turn-ON
Open	Turn-ON

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### 2. Thermal Shutdown

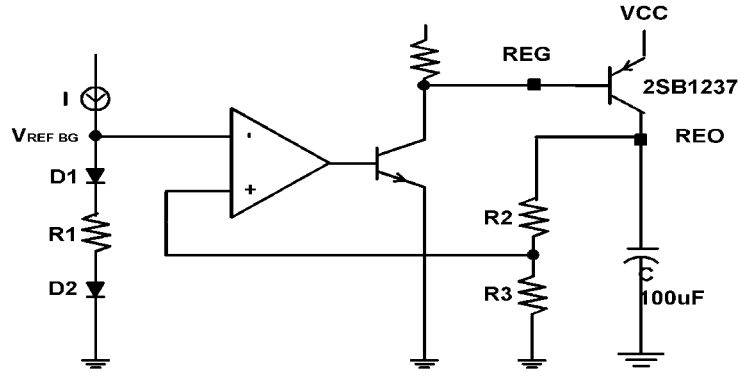


- The  $V_{REFBG}$  is the output voltage of the band-gap-referenced biasing circuit and acts as the input voltage of the TSD circuit. The base-emitter voltage of the TR, Q11 is designed to turn-on at below voltage.

$$V_{BE} = V_{REFBG} \times R12 / (R11+R12) = 460mV$$

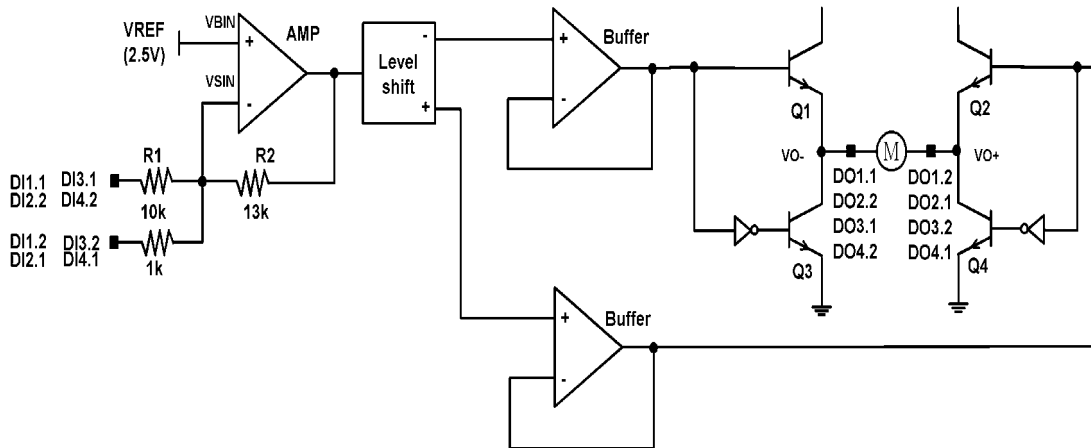
- When the chip temperature rises up to 175°C, then the turn-on voltage of the Q11 would drop down to 460mV.(Hysteresis: 25°C), the Q11 would turn on so the output circuit will be muted.

### 3. Regulator



$$V_{OUT} = V_{REF\ BG} \times 2 = 2.5 \times 2 = 5V \quad (R2 = R3)$$

### 4. Driver



$$Gain(dB) \approx 20 \times \log\left(2 \times \frac{R2}{R1}\right)$$

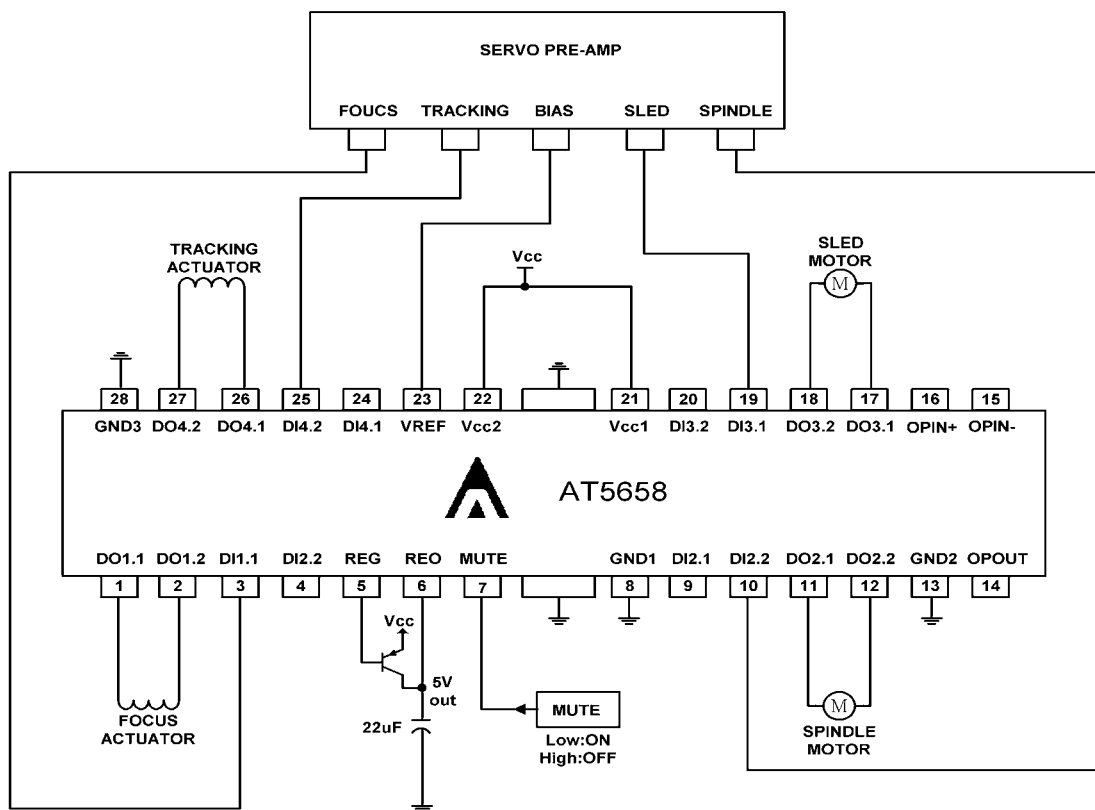
•The voltage,  $V_{REF}$ , is the reference voltage given by the bias voltage of the pin 23. It can be reduced the total gain of BTL drive part, use additional series resistor into the input pin (pin3,10,19,25). It can also increase or decrease the voltage gain of the CH1,CH4 using adjustable pin (pin4,9,20,24,24) by inserting an external series resistor.

Input	Output		
	VO+	VO-	Status
VSIN>VBIN	High	Low	Forward
VSIN=VBIN	VP	VP	Break
VSIN<VBIN	Low	High	Reverse

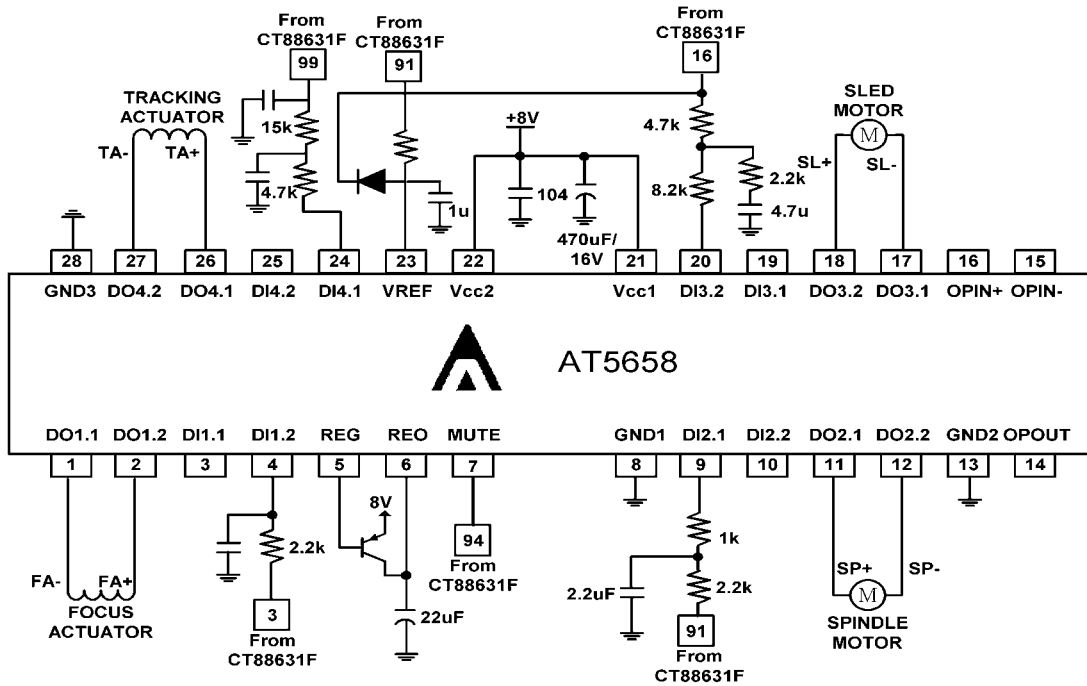
$$*VP = \frac{1}{2}VCC1$$

- If the bias pin (23pin) drops below 1.4V, the output current is muted. Make sure that under normal operating conditions, this pin is at 1.6V or above.
- If the power supply voltage drops below 4.5V typ., the drivers are turned OFF. When the voltage exceeds 4.7V typ., the drivers return to their previous state.

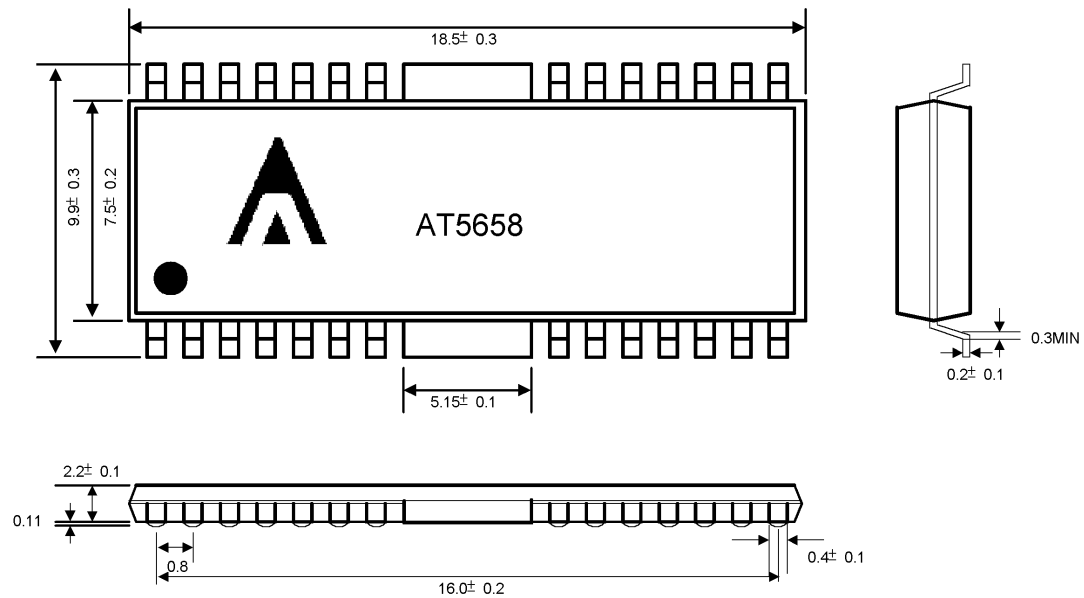
### Typical Application Circuit



**VCD Player Motor Driver Circuit**



**Package Outlines (units:mm): HSOP-28**



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