

# Post amplifier applicable with 1-bit D / A converter

## BH3562F

The BH3562F is a post amplifier applicable with 1-bit D/A converter for compact disc players.

### ●Applications

Portable CD players, etc.

### ●Features

- 1) 2-channel analog filter IC for 1-bit D/A converts.
- 2) Internal partial CR for two channels (left and right) LPF.
- 3) Operates on a single power supply.
- 4) Operates on a power supply voltage as low as 3.1V.

### ●Absolute maximum ratings (Ta = 25°C)

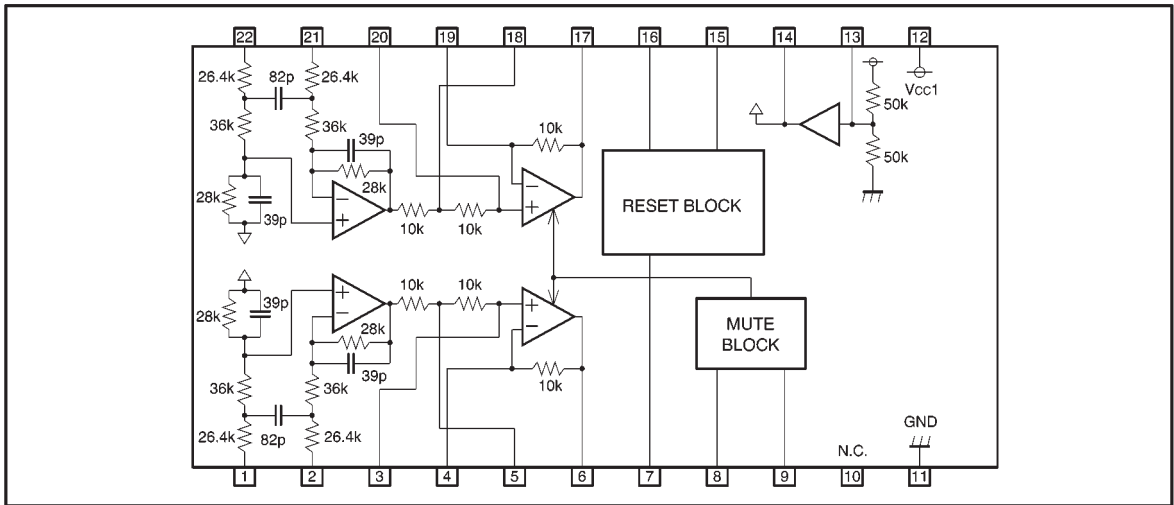
Parameter	Symbol	Limits	Unit
Power supply voltage	V <sub>cc</sub>	5.5	V
Power dissipation	P <sub>d</sub>	450*	mW
Operating temperature	T <sub>opr</sub>	-35~+85	°C
Storage temperature	T <sub>stg</sub>	-55~+150	°C

\* Reduced by 4.5 mW for each increase in Ta of 1°C over 25°C.

### ●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage 1	V <sub>cc1</sub>	3.1~5.5	V
Power supply voltage 2	V <sub>cc2</sub>	2.0~5.5	V

## ● Block diagram



## ● Pin descriptions

Pin No.	Pin name	Function
1	IN1 (+)	Channel 1 positive input
2	IN1 (-)	Channel 1 negative input
3	FILTER 1 - 1	Filter setting (1-1)
4	GAIN 1	Gain adjustment (1)
5	FILTER 2 - 1	Filter setting (2-1)
6	OUT 1	Channel 1 output
7	OUTMUTE 1	Output mute transistor drive (1)
8	C $\tau$	Attached capacitor for setting the mute time constant
9	MUTE	Mute control
10	N.C.	—
11	GND	Ground
12	Vcc1	Power supply
13	BIAS IN	Bias input
14	BIAS OUT	Bias output
15	Vcc2	Reset block idling power supply
16	OUTMUTE 2	Output mute transistor drive (2)
17	OUT 2	Channel 2 output
18	FILTER 2 - 2	Filter setting (2-2)
19	GAIN 2	Gain adjustment (2)
20	FILTER 1 - 2	Filter setting (1-2)
21	IN2 (-)	Channel 2 negative input
22	IN2 (+)	Channel 2 positive input

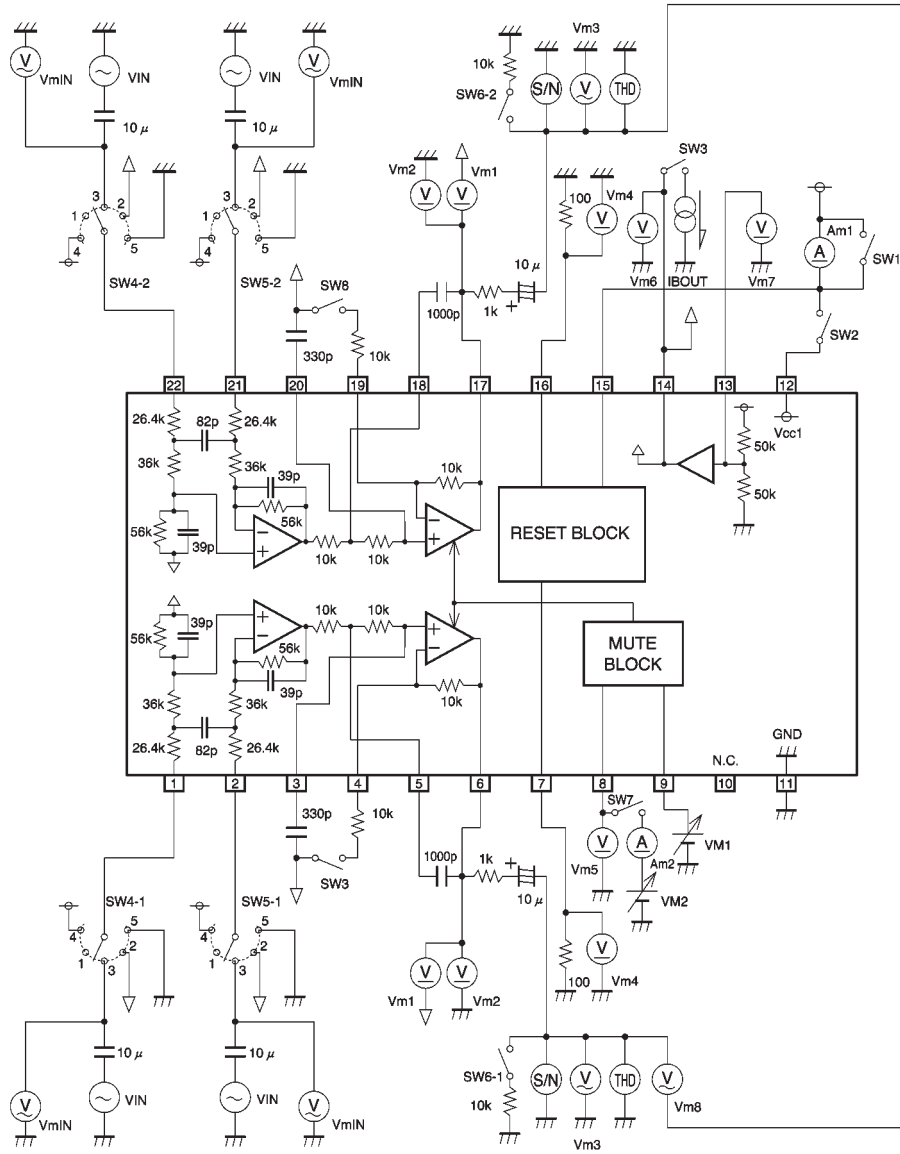
●Electrical characteristics (unless otherwise noted, Ta = 25°C, V<sub>CC1</sub> = 25°C, V<sub>CC2</sub> = 3.5V, R<sub>L</sub> = 10kΩ)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current (1)	I <sub>Q1</sub>	3.0	4.5	6.0	mA	MUTE OFF, R <sub>L</sub> =∞
Quiescent current (2)	I <sub>Q2</sub>	7	10	13	mA	MUTE ON, R <sub>L</sub> =∞
Standby current (1)	I <sub>S1</sub>	—	0	1	μA	MUTE OFF, R <sub>L</sub> =∞, V <sub>CC1</sub> OFF
Standby current (2)	I <sub>S2</sub>	—	0	1	μA	MUTE ON, R <sub>L</sub> =∞, V <sub>CC1</sub> OFF
Offset voltage (1)	V <sub>off2</sub>	-15	0	15	mV	MUTE OFF, reference BIAS OUTPUT
Offset voltage (2)	V <sub>off2</sub>	-15	0	15	mV	MUTE ON, reference BIAS OUTPUT
Bias voltage	V <sub>BO</sub>	1.60	1.75	1.90	V	
Bias voltage, load regulation 1	ΔV <sub>BO1</sub>	—	—	50	mV	I <sub>b</sub> =+5mA (discharge)
Bias voltage, load regulation 2	ΔV <sub>BO2</sub>	—	—	50	mV	I <sub>b</sub> =-5mA (intake)
C τ source current	I <sub>min</sub>	10.5	14.0	17.5	μA	C τ = 1.4 V, MUTE OFF
C τ sink current	I <sub>max</sub>	10.5	14.0	17.5	μA	C τ = 1.4 V, MUTE ON
C τ sink / source current ratio	OUT / IN	0.8	1	1.2	—	
MUTE ON voltage	V <sub>thON1</sub>	1.6	—	—	V	Verifies : output voltage is at BIAS level.
MUTE OFF voltage	V <sub>thOFF1</sub>	—	—	1.2	V	Verifies : output voltage is at HIGH level.
C τ ON voltage (1)	V <sub>thON2</sub>	0.7	—	—	V	Verifies : ext. mute trans. drive current is ON.
C τ OFF voltage (1)	V <sub>thOFF2</sub>	—	—	1.3	V	Verifies : ext. mute trans. drive current in OFF.
C τ ON voltage (2)	V <sub>thON3</sub>	—	—	1.10	V	Verifies : output voltage is at BIAS level.
C τ voltage (2)	V <sub>thOFF3</sub>	1.64	—	—	V	Verifies : output voltage is at HIGH level.
External mute transistor current	I <sub>MUTE</sub>	1.0	1.5	2.0	mA	Converted from current at 100Ω
Output high level voltage	V <sub>OH</sub>	2.55	2.70	—	V	GAIN = 6 dB UP (10 kΩ external) Pos. phase input =3.5 V, neg. phase input 0 V Opposite side = BIAS OUT
Output low level voltage	V <sub>OL</sub>	—	0.75	0.90	V	GAIN = 6 dB UP (10 kΩ external) Pos. phase input =0 V, neg. phase input 3.5 V Opposite side = BIAS OUT
Close loop voltage gain	G <sub>VC</sub>	-10.8	-7.8	-4.8	dB	V <sub>IN</sub> =1kHz, 0.5V <sub>rms</sub>
Frequency characteristics (1)	f <sub>c1</sub>	-10.8	-7.8	-4.8	dB	V <sub>IN</sub> =15kHz, 0.5V <sub>rms</sub>
Frequency characteristics (2)	f <sub>c2</sub>	-21	-16	-11	dB	V <sub>IN</sub> =40kHz, 0.5V <sub>rms</sub>
Mute attenuation	ATT	80	—	—	dB	V <sub>IN</sub> =1kHz, 0.5V <sub>rms</sub>
Crosstalk	CT	—	90	—	dB	V <sub>IN</sub> =1kHz, 0.5V <sub>rms</sub>
Total harmonic distortion	THD	—	0.01	0.02	%	V <sub>IN</sub> =1kHz, 0.5V <sub>rms</sub>
Signal to noise ratio	S / N	90	100	—	dB	0 dB at 1 V <sub>rms</sub> output
L-R Channel balance (1)	CB1	-1	0	1	dB	Positive phase input, V <sub>IN</sub> = 1 kHz, 0.5 V <sub>rms</sub>
L-R Channel balance (2)	CB2	-1	0	1	dB	Negative phase input, V <sub>IN</sub> = 1 kHz, 0.5 V <sub>rms</sub>
Differential balance	G <sub>VB</sub>	45	55	—	dB	Common mode input, V <sub>IN</sub> = 1 kHz, 0.5 V <sub>rms</sub>

Note: A weighing filter is used when measuring AC parameters (excluding frequency characteristics).

©Not designed for radiation resistance.

● Measurement circuit



Note 1: Arrows indicate the positive current direction.  
 Note 2: Unless otherwise noted, AC input (VIN) = 1 kHz sine waves.  
 Note 3: Unless otherwise noted, SW8 = Off.

Fig. 1

● Application example

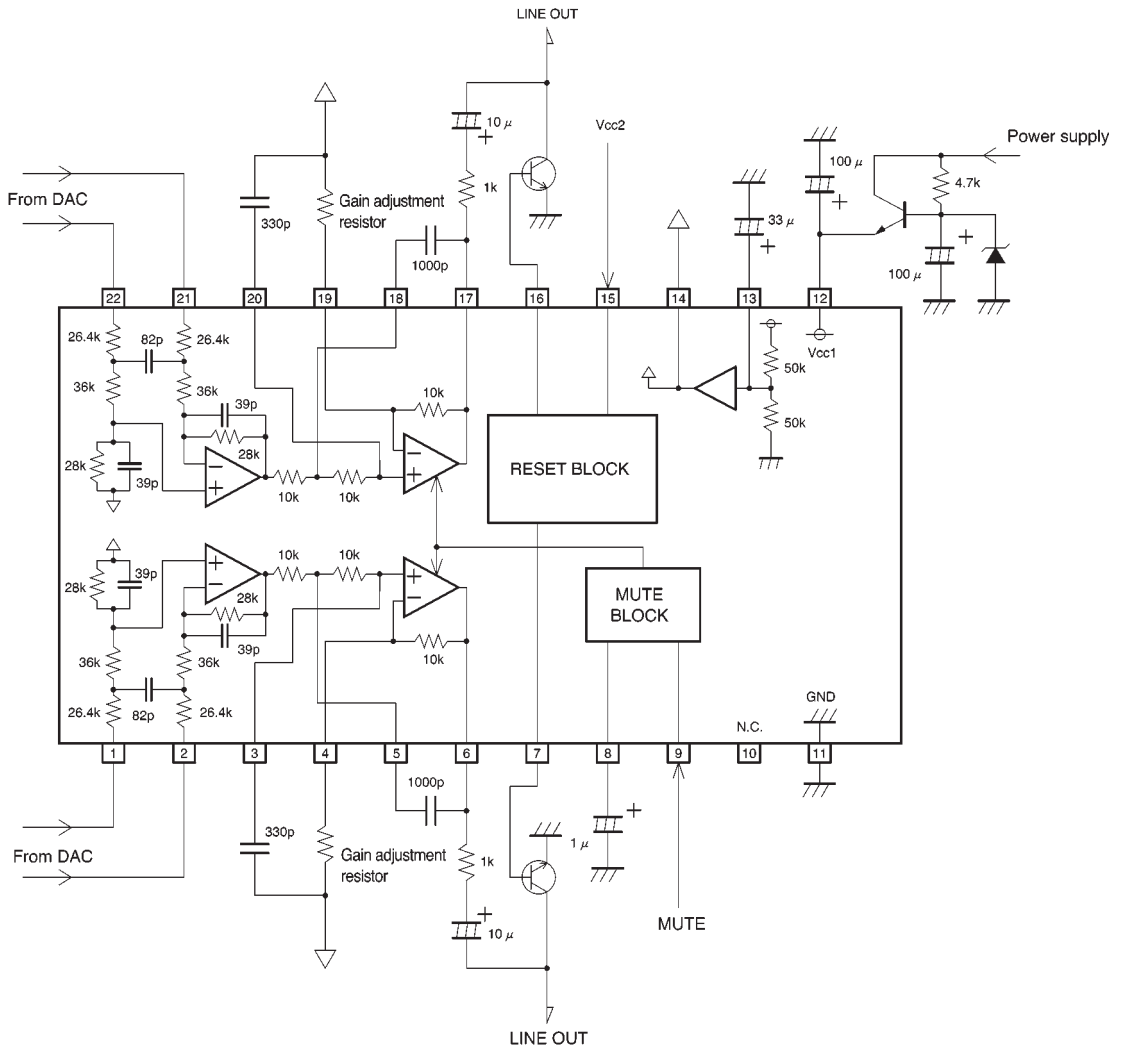


Fig. 2

● Operation notes

- (1) When the MUTE pin voltage reaches 1.5V or higher, the output voltage is muted and the bias level is output.
- (2) Frequency characteristics can be changed by adjusting the capacitor attached to pin 3 (20 pin) or pin 5 (18 pin).
- (3) Gain can be changed by attaching a resistor to pin 4 (19 pin).
- (4) Attach a transistor to pin 7 (16 pin) to mute popping sounds. Recommended transistor: 2SD1781K

- (5) The reset block idling power supply for pin 15 should be left on as it prevents popping sounds.
- (6) To prevent popping sounds due to sudden fluctuation in the power supply voltage, attach a ripple filter.
- (7) To prevent popping sounds due to sudden changes in the mute pin voltage, connect pin 8 to 1 $\mu$ F (approx.) capacitor.
- (8) Attach a by-pass capacitor (approx. 0.1 $\mu$ F) at the base of the IC between the power supply.

● Electrical characteristic curve

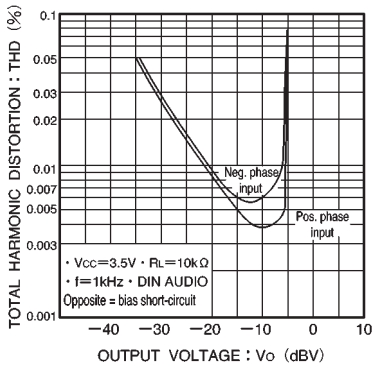


Fig. 3 Output voltage vs. distortion

● External dimensions (Units: mm)

