

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)

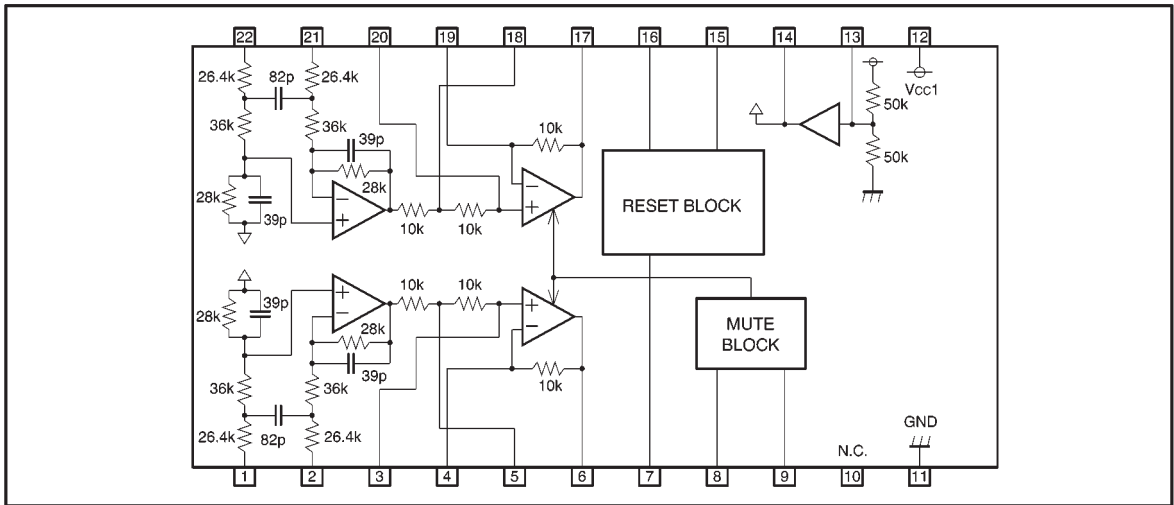
| Parameter | Symbol | Limits | Unit |
|-----------------------|------------------|----------|------|
| Power supply voltage | V _{cc} | 5.5 | V |
| Power dissipation | P _d | 450* | mW |
| Operating temperature | T _{opr} | -35~+85 | °C |
| Storage temperature | T _{stg} | -55~+150 | °C |

* 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 _{cc1} | 3.1~5.5 | V |
| Power supply voltage 2 | V _{cc2} | 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 τ | 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 |

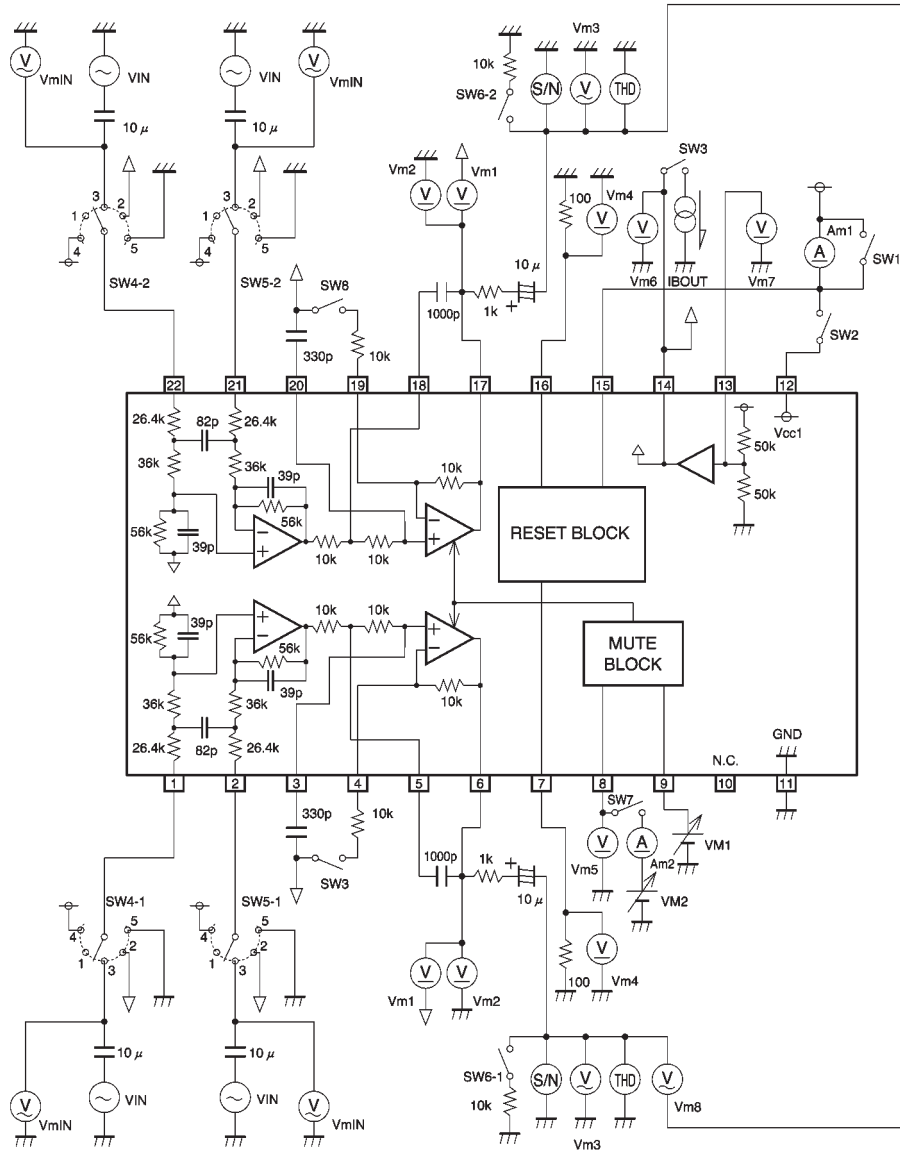
●Electrical characteristics (unless otherwise noted, Ta = 25°C, Vcc1 = 25°C, Vcc2 = 3.5V, RL = 10kΩ)

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

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

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● 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

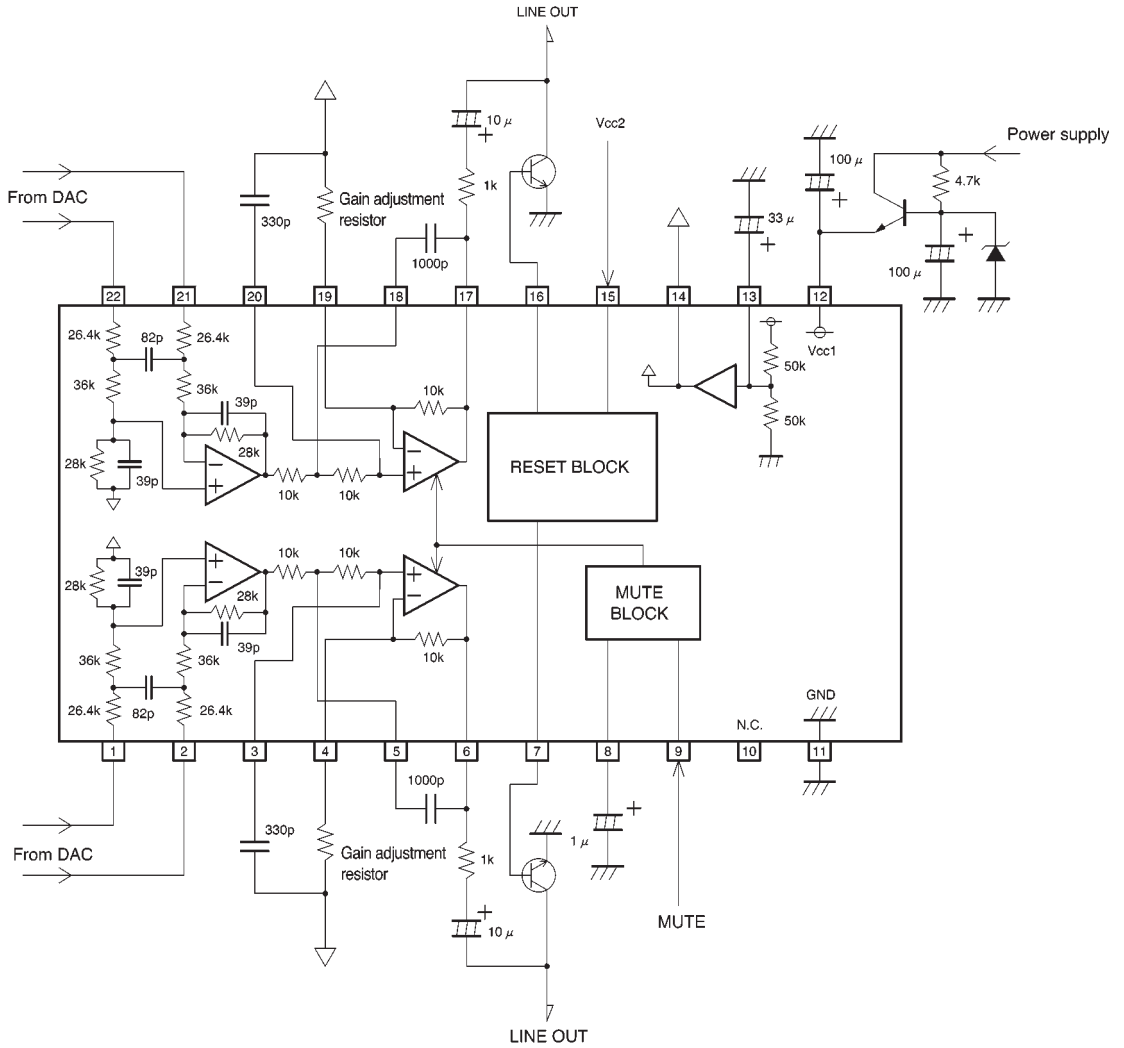


Fig. 2

● 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 μ F (approx.) capacitor.
- (8) Attach a by-pass capacitor (approx. 0.1 μ F) at the base of the IC between the power supply.

● Electrical characteristic curve

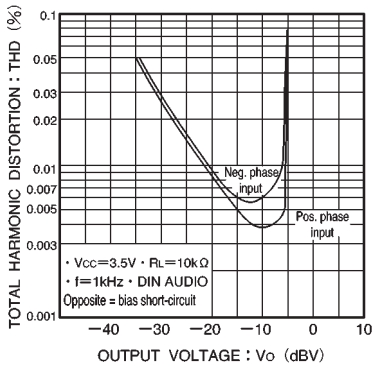


Fig. 3 Output voltage vs. distortion

● External dimensions (Units: mm)

