Headphone amplifier with internal LPF and EVR for CD-ROM

BH3540AFS

The BH3540AFS is an H/P amplifier with internal secondary LPF and EVR circuits. When multibit output from a D/A converter is input, the secondary LPF outputs an audio signal. Output level for headphones can be changed with the EVR circuit. This IC also has independent internal mute circuits for the left and right channels.

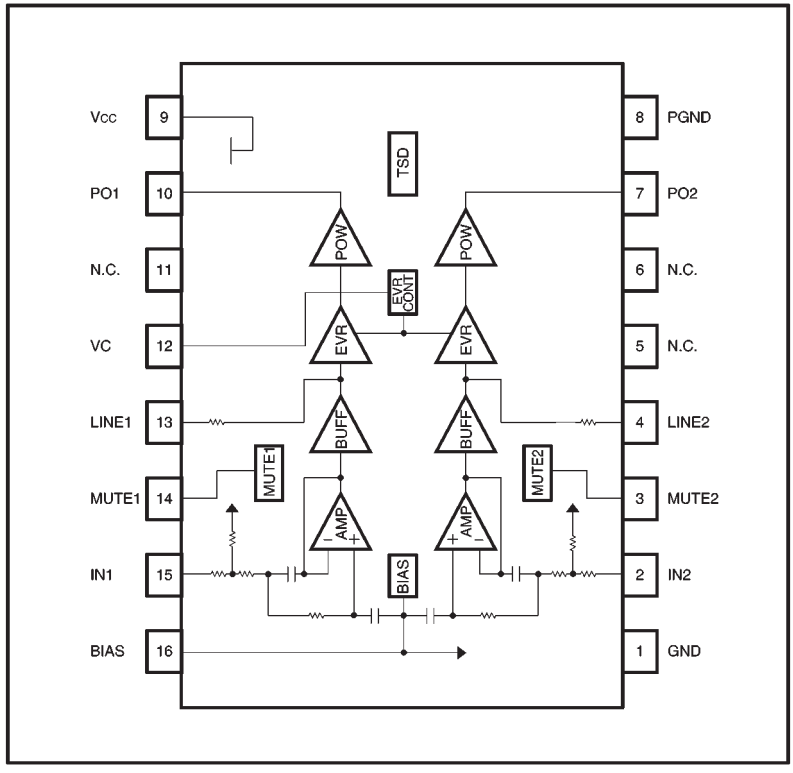
●Applications

CD-ROM drives and other products (with line and headphone output pins) that process digital audio signals

●Features

1) Internal LPF, line amplifier and EVR.
2) Internal mute function.
3) Internal thermal shutdown circuit.
4) No attached oscillation prevention components are needed, even at a load of 8Ω.
5) Mute function reduces the popping noises that can occur when the power is turned on and off.

●Block diagram



●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Applied voltage	V_{CC}	6.5	V
Power dissipation	Pd	500*	mW
Operating temperature	Topr	−10～+75	℃
Storage temperature	Tstg	−55～+125	℃

* Reduced by 5.0 mW for each increase in Ta of 1℃ over 25℃.

●Recommended operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{CC}	4.5	—	5.5	V

●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{CC} = 5.0V, line R_{L1} = 50kΩ, H/P R_{L2} = 32Ω, V_{IN} = 1.8dBV, f = 1kHz, EVR = Max.)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I_Q	6	11	18	mA	V_{IN}=0V_{rms}
Mute pin threshold voltage	V_{TM}	0.3	1.0	1.6	V	MUTE1, 2
〈Line output〉						
Voltage gain 1	G_{VCL1}	−4.74	−3.74	−2.74	dB	
Voltage gain 2	G_{VCL2}	−5.24	−3.74	−2.74	dB	f=20kHz
Interchannel gain differential	ΔG_{VCL}	−0.5	0	0.5	dB	
Total harmonic distortion	THDL	—	0.03	0.1	%	BW=20～20kHz
Maximum output voltage	V_{OML}	0.7	0.8	0.9	V_{rms}	THD＜0.1%
Output noise voltage	V_{NOL}	—	−95	−85	dBV	BW=20～20kHz, input OPEN
Channel separation	CSL	62	67	—	dB	
Mute attenuation	ATTL	60	70	—	dB	Single channel input
Ripple rejection	RRL	45	50	—	dB	f_{RR}=100Hz, V_{RR}=−20dBV
〈Headphone amplifier〉						
Voltage gain	G_{VCL}	−5.24	−3.74	−2.74	dB	
Interchannel gain differential	ΔG_{VC}	−0.5	0	0.5	dB	
Total harmonic distortion	THDH	—	0.06	0.1	%	BW=20～20kHz
Rated output 1	P_{O1}	14.1	20	25.3	mW	RL=32Ω, THD＜0.1%
Rated output 2	P_{O2}	28.2	40	50.6	mW	RL=16Ω, THD＜0.1%
Output noise voltage	V_{NOH}	—	−90	−85	dBV	BW=20～20kHz, input OPEN
Channel separation	CSH	60	65	—	dB	
Mute attenuation	ATTH	85	90	—	dB	Single channel input
Ripple rejection	RRH	43	50	—	dB	f_{RR}=100Hz, V_{RR}=−20dBV
EVR attenuation	ATT	70	80	—	dB	EVR=Max.～Min.

◎Not designed for radiation resistance.

●Measurment circuit

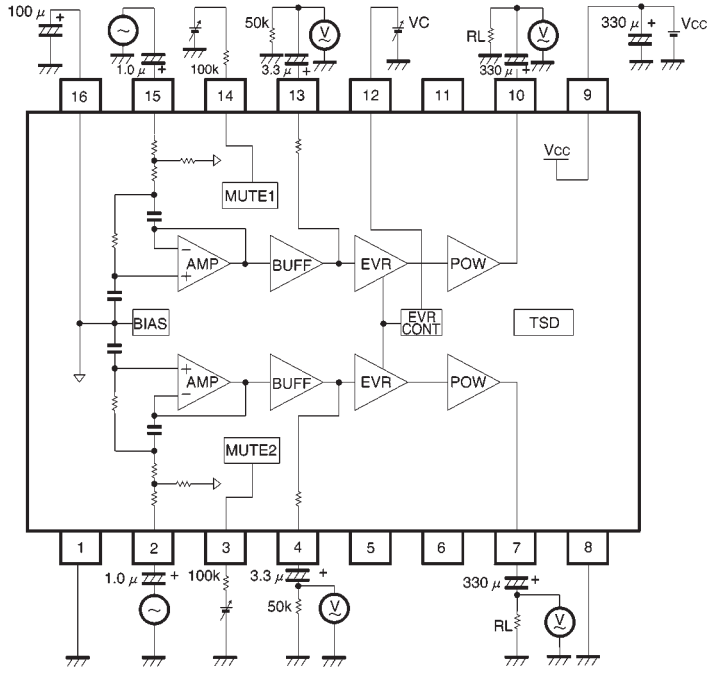


Fig. 1

●Application example

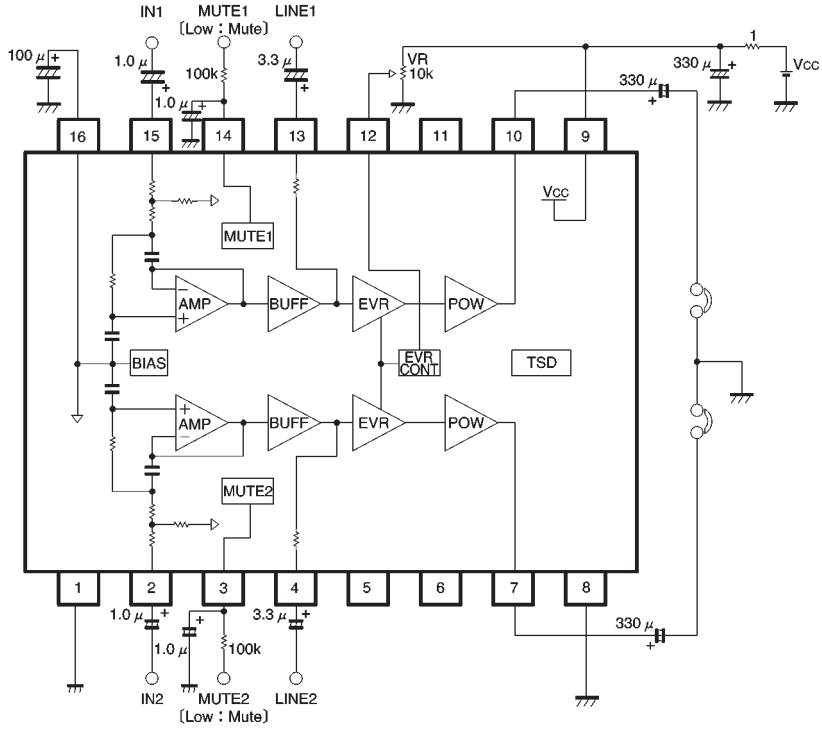


Fig. 2

●Operation notes

(1) Preventing popping noises

The BH3540AFS has a mute function that reduces the popping noises that can occur when the power is turned on or off. To further reduce these popping noises, attach a capacitor and resistor to the mute pin (pins 3 and 14).

(2) Recommended time chart

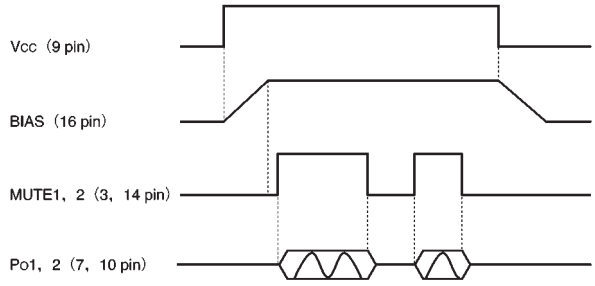


Fig. 3

●Electrical characteristic curves

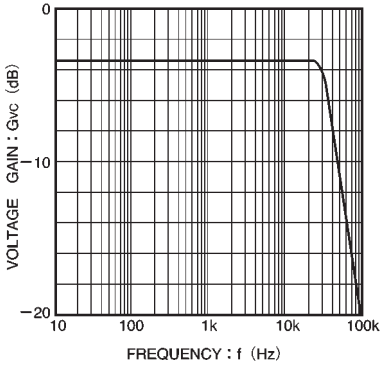


Fig. 4 Voltage gain vs. frequency

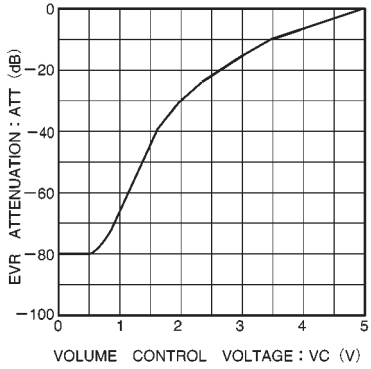
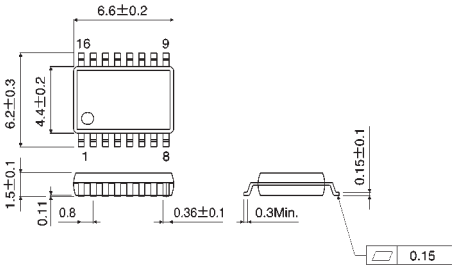


Fig. 5 EVR characteristics

●External dimensions (Units: mm)



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