Headphone amplifier with internal LPF and EVR for CD-ROM

BA3530FS

The BA3530FS 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. The amplifier circuit allows for line output and headphone output. The 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 components are needed for oscillation prevention, even at a load of 8Ω.
5) Mute function reduces the popping noises that can occur when the power is turned on and off.

●Absolute maximum ratings (Ta=25℃)

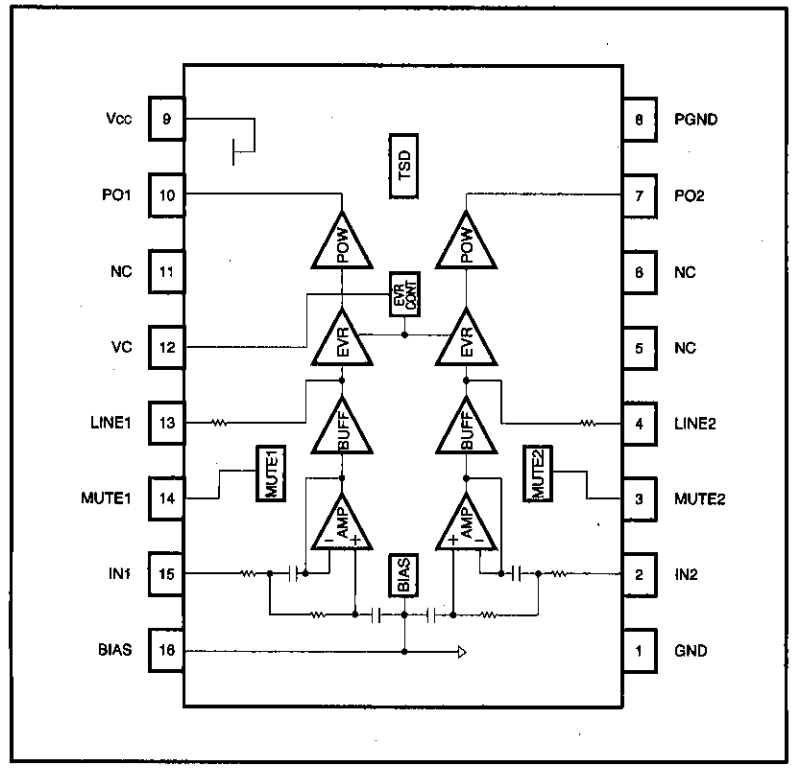
Parameter	Symbol	Limits	Unit
Power supply voltage	Vcc	6.5	V
Power dissipation	Pd	500 *	mW
Operating temperature	Topr	−10~75	℃
Storage temperature	Tstg	−55~125	℃

* 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	Vcc	4.5	−	5.5	V

●Block diagram



●Electrical characteristics (unless otherwise noted, Ta=25℃, V_{CC}=5.0V, line R_{L1}=50kΩ, H/P R_{L2}=32Ω, V_{IN}=0.8Vrms, f=1kHz, EVR Max.)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I_Q	6	11	18	mA	V_{IN}=0Vrms
Mute pin threshold voltage	V_{TM}	0.3	1.0	1.6	V	MUTE1, 2
〈Line out〉						
Voltage gain 1	$G_{VCL}1$	−1.0	0.0	0.5	dB	
Voltage gain 2	$G_{VCL}2$	−1.5	0.0	0.5	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	60	65	—	dB	
Mute attenuation	ATTL	65	75	—	dB	Single channel input
Ripple rejection	RRL	50	55	—	dB	f_{RR}=100Hz, V_{RR}=−20dBV
〈Headphone amplifier〉						
Voltage gain	G_{VCL}	−1.5	0.0	1.0	dB	
Interchannel gain differential	ΔG_{VC}	−0.5	0	0.5	dB	
Total harmonic distortion	THDH	--	0.04	0.1	%	BW=20~20kHz
Rated output 1	P_{O1}	14	20	25	mW	RL=32Ω, THD<0.1%
Rated output 2	P_{O2}	28	40	50	mW	RL=16Ω, THD<0.1%
Output noise voltage	V_{NOH}	--	−85	−80	dBV	BW = 20-20kHz, input = open
Channel Separation	CSH	70	75	—	dB	
Mute attenuation	ATTH	85	90	—	dB	Single channel input
Ripple rejection	RRH	45	50	—	dB	f_{RR}=100Hz, V_{RR}=−20dBV
EVR attenuation	ATT	65	75	—	dB	EVR=Max.~Min.

●Measurement circuit

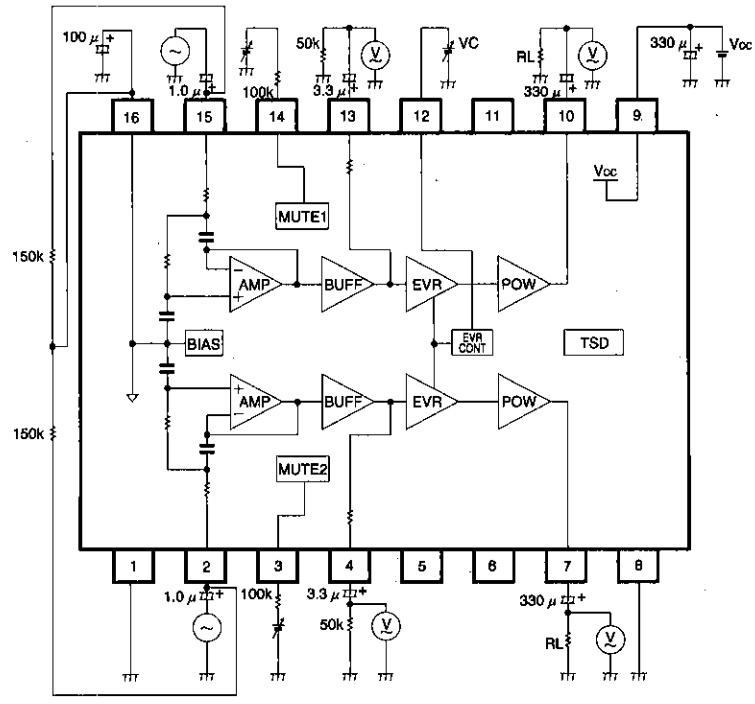


Fig. 1

●Application example

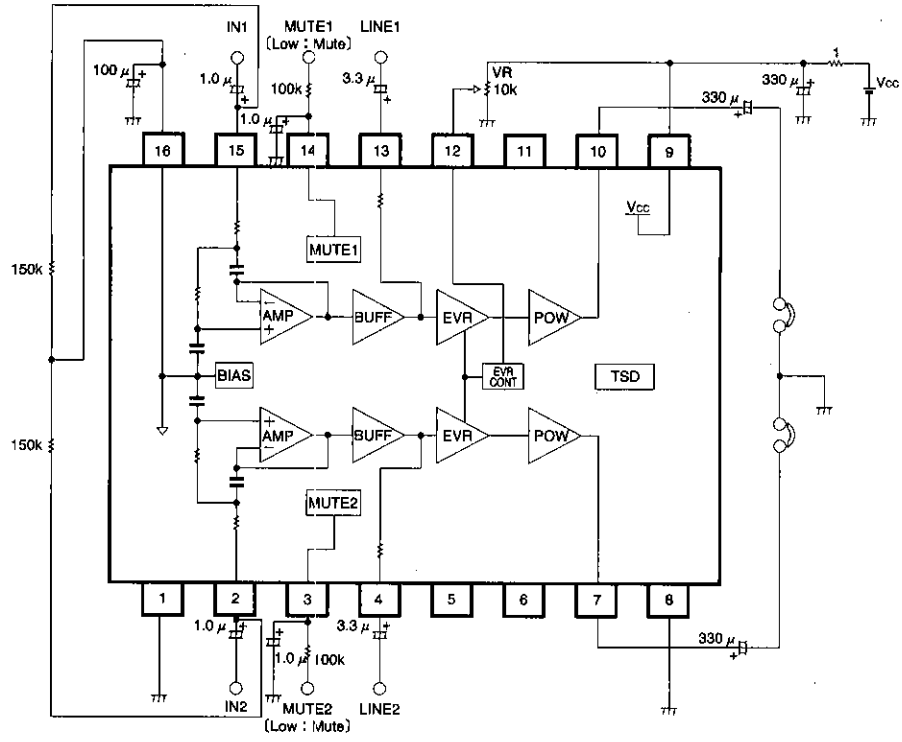


Fig. 2

●Operation notes

1. Preventing popping noises

The BA3530FS has a mute function that reduces the popping noises that can occur when the power is turned on or off. The popping noises that occur when the muting function turns on and off can be reduced by attaching a capacitor and resistor to the mute pins (pins 3 and 14).

2. Recommended time chart

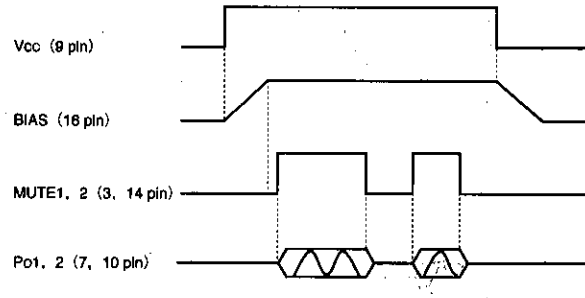


Fig. 3

●Electrical characteristic curves

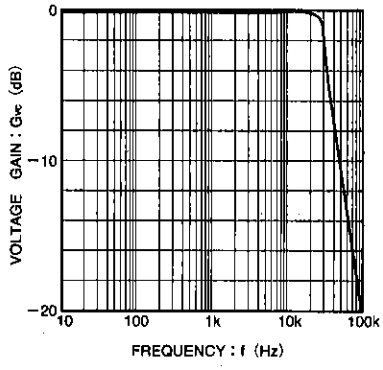


Fig. 4 Voltage gain vs. frequency characteristics

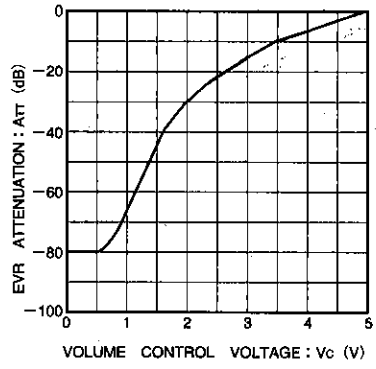
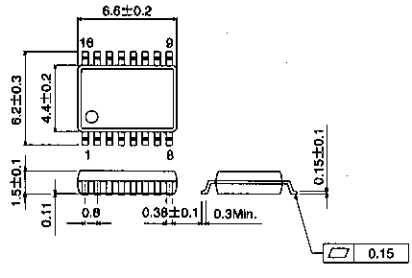


Fig. 5 EVR attenuation characteristic

●External dimensions (Units: mm)



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