

3V dual pre/power amplifier

BA3516

The BA3516 is a dual pre/power amplifier designed for headphone stereo applications. It operates off a 3V supply. The preamplifier block can be direct-coupled, and the power amplifiers do not require bootstrap capacitors, and use a fixed-gain negative feedback circuit to reduce the number of external components required and allow compact and reliable set designs.

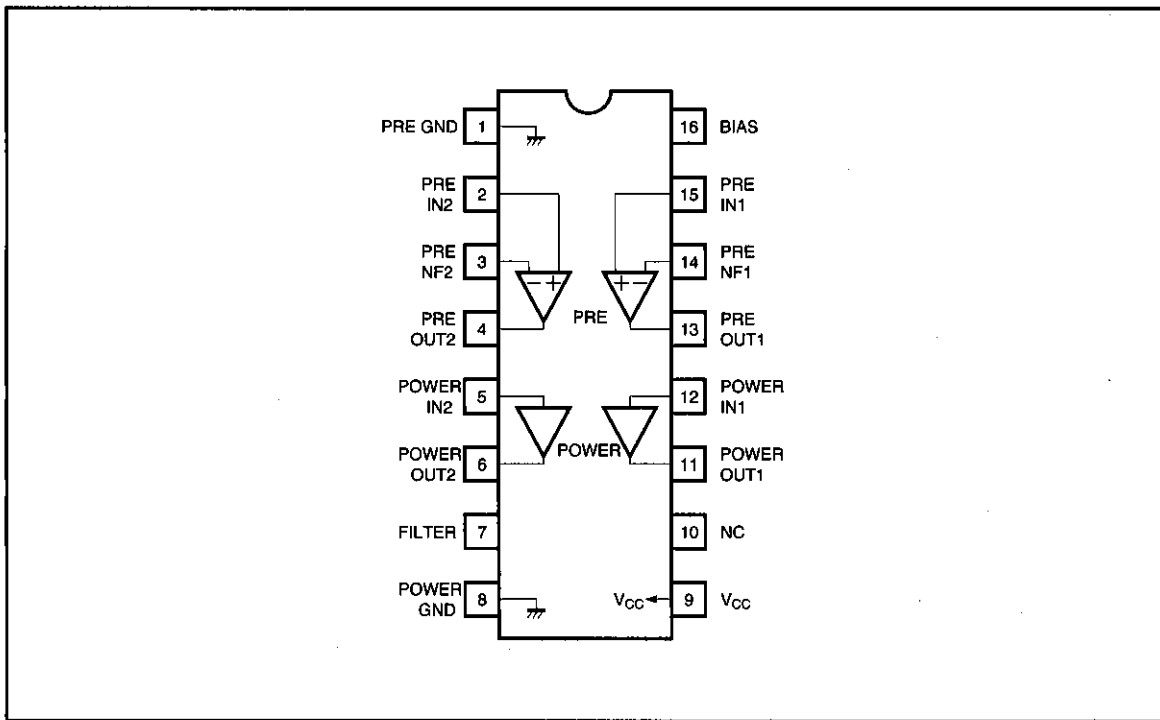
●Applications

3V headphone stereos and 3V radio cassette players.

●Features

- 1) Dual preamplifiers and power amplifiers on one chip.
- 2) Preamplifiers can be direct coupled.
- 3) Bootstrap capacitors for the power amplifiers are not required.
- 4) The preamplifiers have high gain (78dB), low noise ($1 \mu\text{Vrms}$), and low distortion (0.03%).
- 5) The power amplifiers have high output ($40\text{mW} \times 2$), low noise ($80 \mu\text{Vrms}$), and low distortion (0.5%).

●Block diagram



● Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Supply voltage	V _{CC}	4.5	V
Power dissipation	P _d	1000*1	mW
Operating temperature	T _{opr}	-25~75	°C
Storage temperature	T _{stg}	-55~125	°C

*1 Reduced by 10.0mW for each increase in Ta of 1°C over 25°C.

● Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V _{CC}	1.8	2.4	3.6	V

● Electrical characteristics (unless otherwise specified Ta = 25°C, V_{CC} = 2.4V and f = 1kHz)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement Circuit
Quiescent circuit current	I _Q	—	8	14	mA	V _{IN} =0V _{rms}	Fig.1
<Preamplifier> R _L =10kΩ							
Open-circuit voltage gain	G _{VO}	72	78	—	dB	V _O =-10dBm	Fig.1
Maximum output voltage	V _{OM}	200	300	—	mV _{rms}	THD=1%	Fig.1
Total harmonic distortion	THD ₁	—	0.03	0.15	%	V _O =0.2V _{rms} , NAB33dB	Fig.1
Input conversion-noise voltage	V _{NIN}	—	1.0	1.8	μV _{rms}	R _g =2.2kΩ, BPF20~20kHz	Fig.1
Ripple rejection	RR ₁	40	47	—	dB	V _{RR} =-20dBm, f=100Hz NAB33dB, R _g =2.2kΩ	Fig.1
Input bias current	I _{B1}	—	60	300	nA	V _{IN} =0V _{rms}	Fig.1
<Power amplifier> R _L =16Ω							
Rated output	P _{OUT}	30	40	—	mW	THD=10%	Fig.1
Closed-circuit voltage gain	G _{VC}	34	36	38	dB	V _{IN} =-40dBm	Fig.1
Total harmonic distortion	THD ₂	—	0.5	1.5	%	P _O =1mW	Fig.1
Output noise voltage	V _{NO}	—	80	125	μV _{rms}	R _g =0Ω, BPF20~20kHz	Fig.1
Ripple rejection	RR ₂	35	48	—	dB	V _{RR} =-20dBm, f=100Hz, R _g =0Ω	Fig.1
Input resistance	R _{IN}	21.4	30	38.6	kΩ	—	Fig.1
Input bias current	I _{B2}	—	22	80	nA	V _{IN} =0V _{rms} , R _g =10kΩ *1	Fig.1
Channel balance	CB	—	0	0.7	dB	V _O =-10dBm	Fig.1
<Preamplifier + power amplifier <connection as per application example circuit>>							
Channel separation	CS _{L-R}	27	37	—	dB	Pre-R _g =2.2kΩ, VR Max.*2 Single channel Power-V _O =-5dBm BPF20~20kHz	Fig.1
Leakage from preamp to power amp for signal leak VR Min.	SL	—	-63	-57	dBm	Power-R _g =0Ω *3 When both channels are operating Pre V _{out} =-12dBm	Fig.1

*1 $I_{B2} = \frac{V_{B2}}{10k\Omega} \times \frac{4}{3}$

VB2: Voltage at each end of R_g=10kΩ.

*2 0dB attenuation from the preamplifier output to power amplifier input.

*3 Power amplifier signal source impedance is 0Ω

Pre-/power amplifiers for headphone stereos
Low-frequency amplifiers

● Measurement circuit

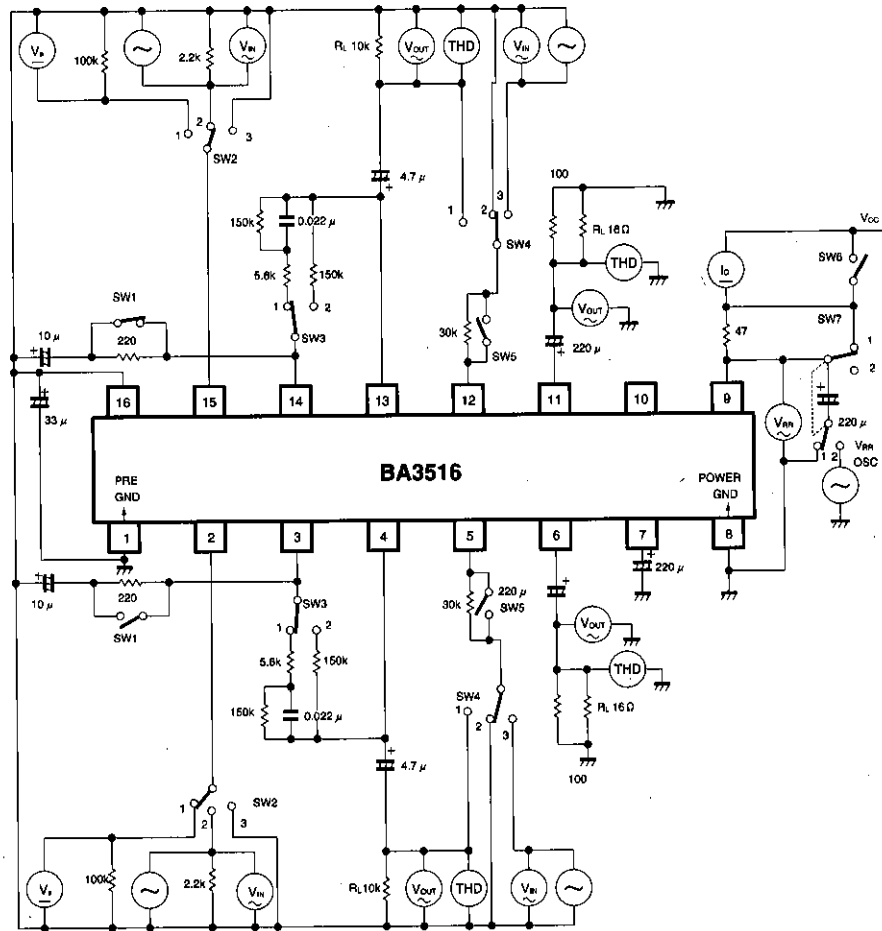


Fig. 1

●Application example

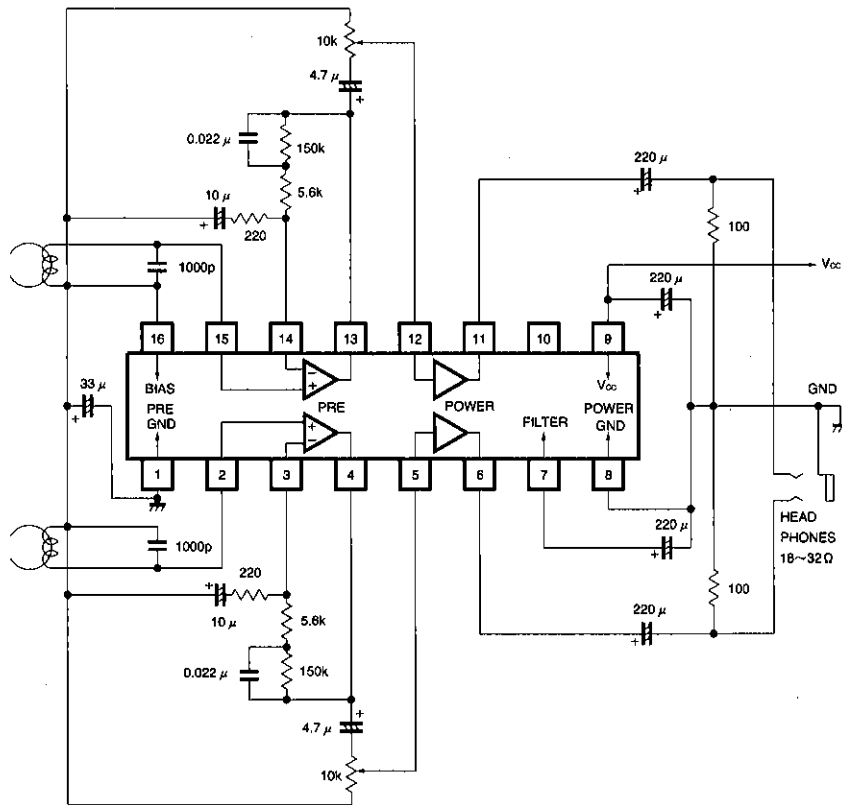
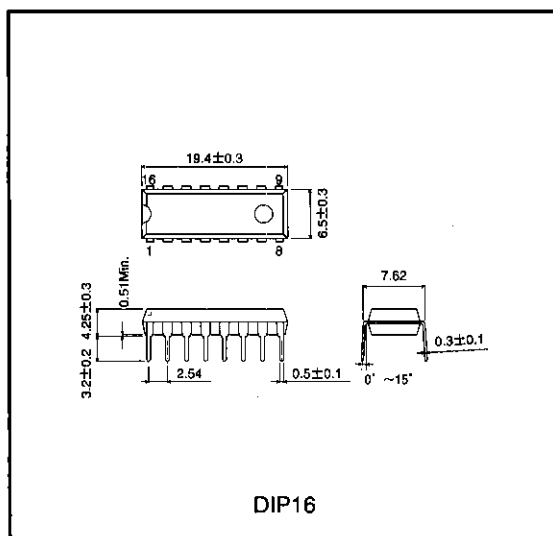


Fig. 2

●External dimensions (Unit: mm)



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