

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.

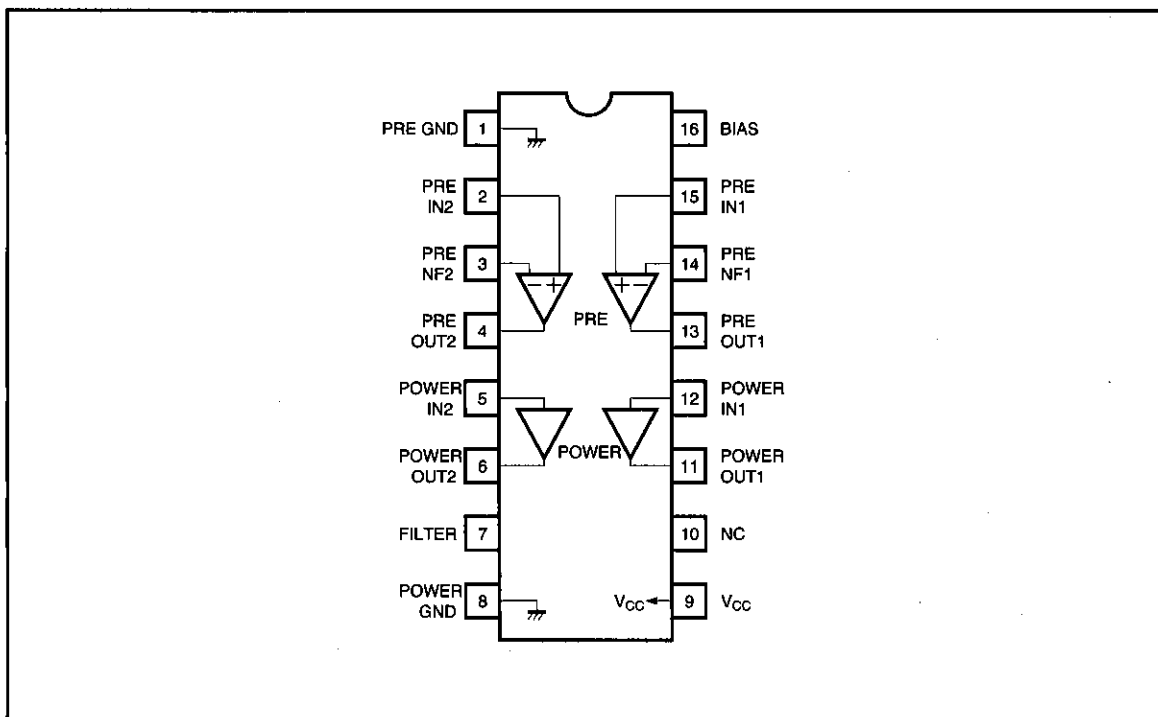
●Applications

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

V_{B2}: 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

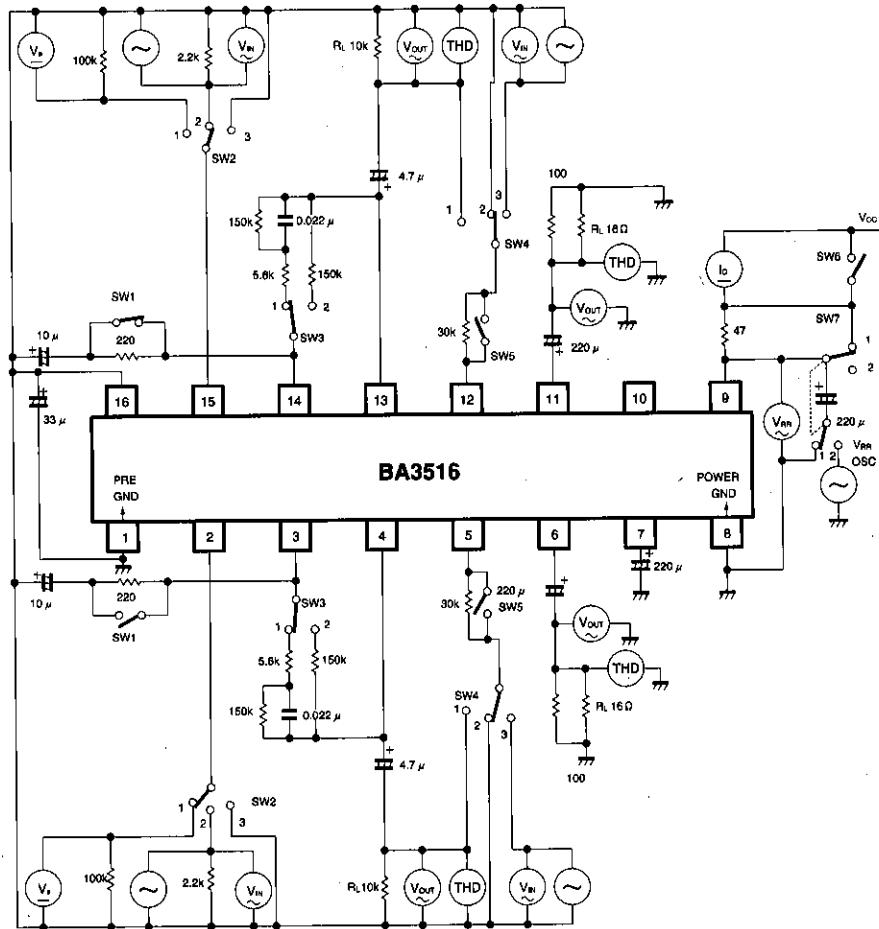


Fig. 1

●Application example

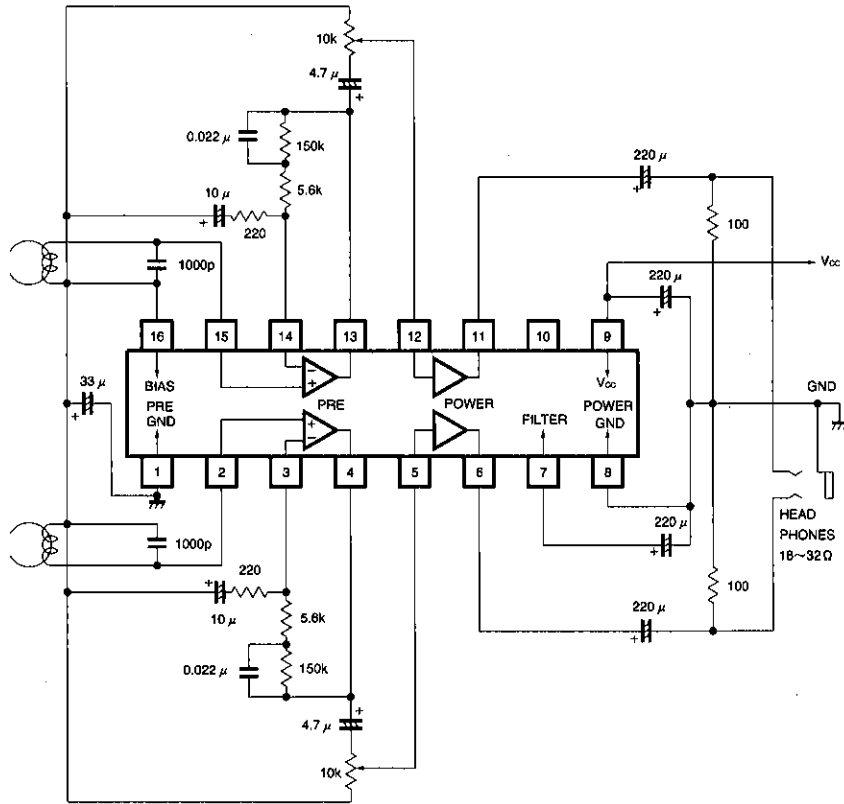
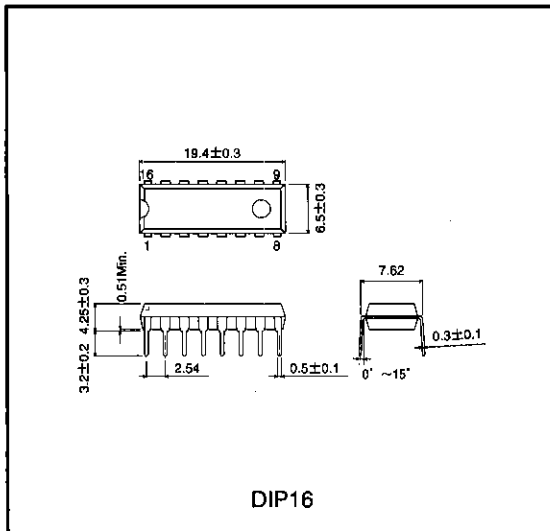


Fig. 2

●External dimensions (Unit: mm)



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